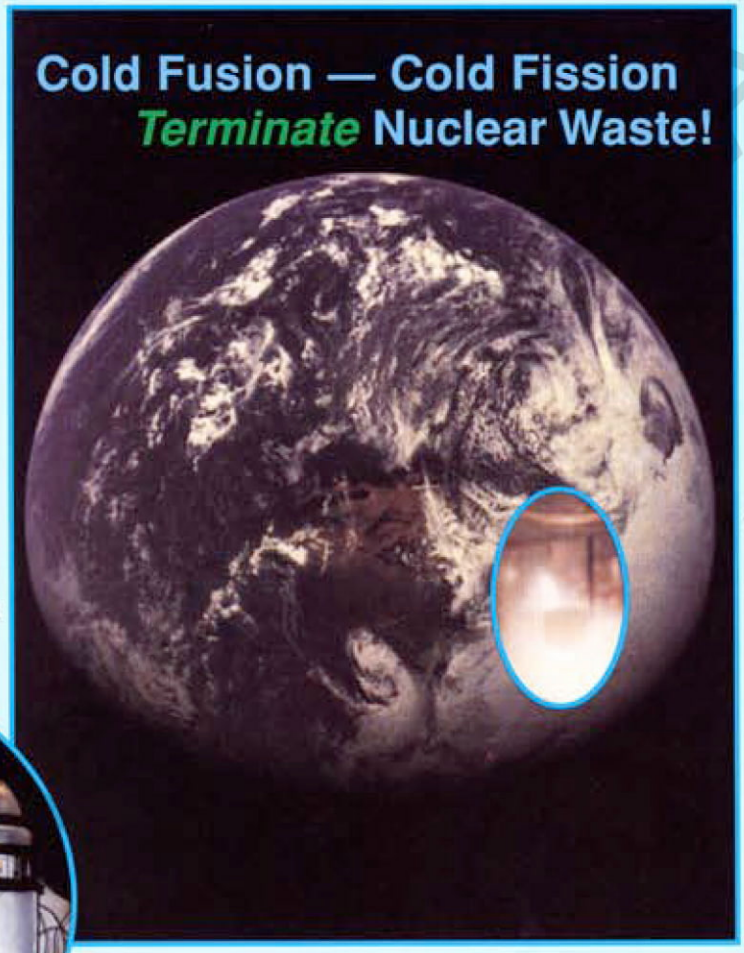
Infinite Energy™
Cold Fusion and New Energy Technology
Published by Cold Fusion Technology, Inc. Vol.3, No.13 & No.14, 1997
SPECIAL DOUBLE ISSUE

TRANSMUTING ELEMENTS



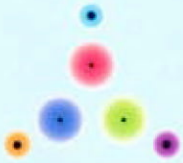
**TWO Teams—
The Cincinnati Group
and *CETI*—
Launch the
Modern Alchemy Age**

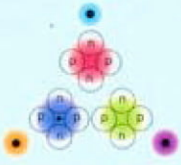
**The Beginning
of the End
of the
"Cold Nuclear War"**

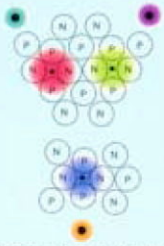
COLD NUCLEAR HEAT

**Hot water heater in Florida
has run for MONTHS .....**

***Pseudo-Nuclei,
Subquarks, and
Hemitrons —***
**Does the Theory of
Dr. Joseph L. McKibben
Explain Transmutation
and Cold Fusion?**


Pseudohelium nucleus


Pseudooxygen nucleus


Pseudosilicon nucleus type 2

U.S. $5.95
Canada $7.95

7 74478 87813 9 14

Cold Fusion Technologies and the Economy
GREEN MONEY — ***New Energy Technologies Investment Fund***

Non-Profit Archive

Cold Fusion & New Energy Lectures

by Dr. Eugene F. Mallove, Editor-in-Chief

***Infinite Energy* Magazine**

and author of *Fire From Ice*

Generate lots of excess heat (and new-thinking!)

in your scientific, engineering, business, civic, or religious organization. Call: 603-228-4516; Fax: 603-224-5975

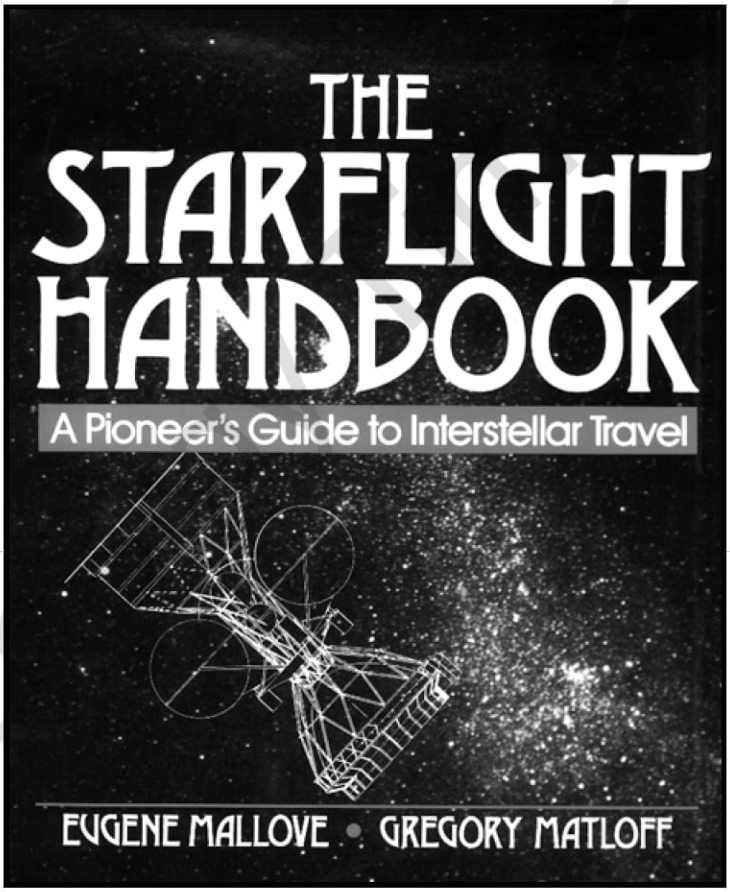
1989 was a Big Year! Cold Fusion *and* *The Starflight Handbook!*

"The Starflight Handbook is an indispensable compendium of the many and varied methods for traversing the vast interstellar gulf—don't leave the Solar System without it!"
—Dr. Robert L. Forward

"Very sensible, very complete and useful. Its good use of references and technical 'sidebars' adds to the book and allows the nontechnical text to be used by ordinary readers in an easy fashion. I certainly would recommend this book to anyone doing any thinking at all about interstellar flight or the notion of possibilities of contacts between hypothetical civilizations in different star systems."

—Louis Friedman
Executive Director,
The Planetary Society

Ad Astra per Aspera!



The Starflight Handbook is the first and only compendium on planet Earth of the radical new technologies now on the drawing boards of some of our smartest and most imaginative space scientists and engineers. Scientists and engineers as well as general readers will be captivated by its:

- In-depth discussions of everything from nuclear pulse propulsion engines to in-flight navigation, in flowing, nontechnical language
- Sidebars and appendices cover technical and mathematical concepts in detail
- Seventy-five elegant and enlightening illustrations depicting starships and their hardware

A JOHN WILEY & SONS, Inc.
SCIENCE EDITION

Hardcover, 273 pages,
extensive bibliography
ISBN 0-471-61912-4

.....ORDER YOUR COPY TODAY

Inscribed by Eugene Mallove

ONLY $29.95 + $5.00 air shipping (US and Canada); Elsewhere, $12.00 air-shipping

Send Payment to:
Cold Fusion Technology,
P.O. Box 2816, Concord, NH 03302-2816
Or, Fax Credit Card Info: 603-224-5975

New Energy Times Archive

Infinite Energy

Cold Fusion and New Energy Technology

Volume 3, No. 13 & 14, March/June 1997

Editor-in-Chief and Publisher
Eugene F. Mallove, Sc.D.

Associate Editor
Hal Fox
(Fusion Information Center, Salt Lake City, Utah)

Contributing Editors
Jed Rothwell (Georgia) 770-451-9890
Christopher Tinsley (UK) 44-1159-25-4308
Assistant to UK Editor, Susan Seddon

Office Systems Assistant
Jeremy Slayton

Scientific Advisory Board
Dr. Harold Aspden
Southampton, UK
Dr. Robert W. Bass
Pahrump, Nevada
Dr. John O'M. Bockris
Texas A&M University
Dr. Dennis Cravens
Cloudcroft, New Mexico
Dr. Peter Glück
Institute of Isotopic and Molecular Technology, Romania
Dr. Xing Zhong Li
Tsinghua University, Beijing, China
Dr. M. Srinivasan
Bhabha Atomic Research Center, India
Dr. Edmund Storms
ENECO

INFINITE ENERGY Magazine *(ISSN 1081-6372) is published six times a year by Cold Fusion Technology, Inc. P.O. Box 2816, Concord, New Hampshire 03302-2816. Subscription price: $29.95 U.S. and Canada, $49.95 other foreign. POSTMASTER: Send address changes to INFINITE ENERGY, P.O. Box 2816, Concord, NH 03302-2816.*

INFINITE ENERGY Magazine
P.O. Box 2816
Concord, NH 03302-2816
Phone: (603) 228-4516
Fax: (603) 224-5975

INTERNET:
subscribe@infinite-energy.com
editor@infinite-energy.com
http://ourworld.compuserve.com/homepages/JedRothwell

PRINTED IN THE USA
Copyright © by Cold Fusion Technology, Inc.
All rights reserved.

Table of Contents

••• *SPECIAL DOUBLE ISSUE* •••

Volume 3, Issue #13 & #14 March-June 1997 ***(Nominal Months)***

Astonishing, Very Welcome Letter from the U.S. Department of Energy!! 3

Breaking Through, Editorial 4
Comets, Cold Fusion, and Alchemy

Letters to the Editor 7

New Energy Technologies Investment Fund 10

Transmuting Nuclear Waste at Low Energy

Good Morning America-June 11, 1997 13

Radioactivity Remediation—CETI 14

Radioactivity Remediation—Cincinnati Group 16

Cold Fusion Ice Cream? —from *Gene to Ben* 29

"Free Energy: The Race to Zero Point"—
Just a few excerpts...from the video 32

Cold Fusion and the Future
Part II - Economics and Society
Jed Rothwell 33

Fourth International Symposium on New Energy
Eugene Mallove 44

Continuing Research into T.H. Moray's and Other Free Energy Devices
John W. Moreland, Ph.D. 46

Alternate Interpretation of Mass Gain at Near Light Velocity; Nuclear Battery Connection
Paul M. Brown, Ph.D. 52

Tesla Symposium — 1997
Eugene Mallove 54

Testing the Ragland Triode Cell
Christopher Tinsley, Jed Rothwell 55

The Things We Get Up To.....SMOT: Simplified Over-Unity Toy
Christopher Tinsley 59

Necessity Never Married Invention's Father
"Soo" Seddon 62

Calendar & ICCF-7 News 63

"On the Ropes" — BBC Interview with
Prof. Martin Fleischmann 66

Hot vs. Cold Fusion on National Public Radio
T. Kenneth Fowler, Eugene Mallove 70

COVER ART

(Center) Planet Earth —from the Apollo 16 Mission ***(Courtesy, NASA)***

(Oval insert on Earth) Glow from Cincinnati Group Prototype Radioactivity Remediation Cell ***(Photo, 1995, by Gene Mallove)***

Prototype Cold Nuclear-Powered Hot Water Heater, In Continuous Operation Since February 1997 Producing Hundreds of Watts at 20% to 50% Excess Power ***(Courtesy, CETI)***

Subquark Attachment to Host Nuclei in the Theory of Dr. Joseph L. McKibben ***(Courtesy, Dr. McKibben)***

New Energy Times Archive

Table of Contents — Continued

Champion of Ether Energy —Dr. Robert Adams
Lenora Anderson 77

The Adams Thermo-Motor Generator
Dr. Robert Adams 79

BRIEFS
• Fleischmann/Pons Patent Doomed in US? • Mallove on Art Bell Show • Cold Fusion in *Analog* • Huizenga Blinks *Again* • Energy INFOCard • Stefan Marinov—A Suicide • 81

Catalyst Institute Launched
Stephen Kaplan 85

Carl Sagan and Cold Fusion
Eugene Mallove, Sc.D. 86

Review of NASW's *A Field Guide for Science Writers*
Eugene Mallove, Sc.D. 87

Review of *Yes, We Have No Neutrons*
Eugene Mallove, Sc.D. 90

Extracting Intermolecular Bond Energy from Water
Peter Graneau, Ph.D. 92

The Nucleo-Electric Effect
David Moon and Chuck Bennett 95

Charge Clusters—The Basis of Zero Point Energy Inventions
Moray B. King, Ph.D. 96

Catalytic Behavior of One (or Two)f Subquarks Bound to Their Nuclear Hosts
Joseph L. McKibben, Ph.D. 103

BlackLight Power, Inc. —Financial News 105

Neutrino Power
Graham Toquer 106

Work in Constant Entropy Systems
Remi Cornwall 112

The Hypothesis and Equations of the Unified Matter Field
A.A. Nassikas, Ph.D. 120

Washington Watch - Whither Hot Fusion?
Jed Rothwell 125

Highlights from *Infinite Energy* 127

Astonishing, Very Welcome Letter from the U.S. Department of Energy!

Department of Energy

Washington, DC 20585

June 10, 1997

Mr. James W. Reding
President and Chief Executive Officer
Clean Energy Technologies, Inc.
2074 20th Street
Sarasota, Fl. 34234

Dear Mr. Reding:

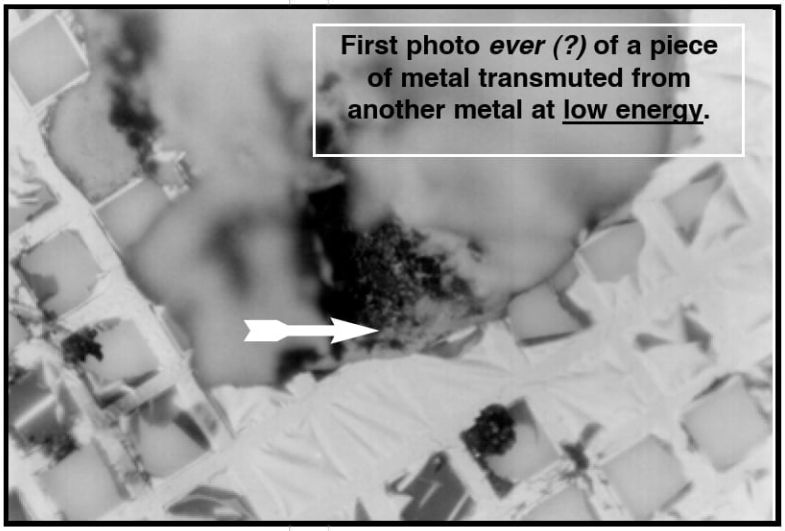
I would like to thank you on behalf of my colleagues and the Department of Energy for providing us with a tour of your facility and briefing on your new energy technology on 29 May. I would also like to thank you and your staff for their kind hospitality during our stay in Sarasota.

We are putting together names, addresses, etc., of other Department of Energy and U. S. Government organizations that may have an interest in your technology or may be able to assist you in obtaining funding, guidance, or other types of support as you bring your invention to market. We will forward this information to you hopefully within the next two weeks.

Best of luck on the development of what looks to be a most promising innovation in energy production.

Sincerely,

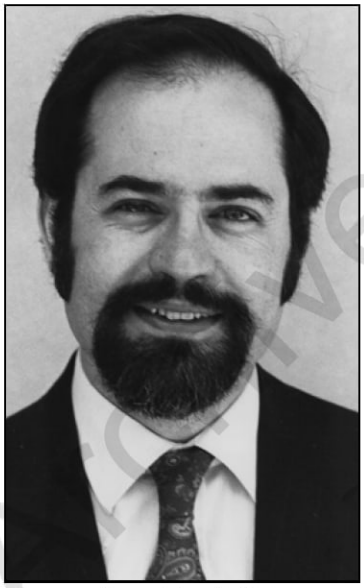
Office of Energy Intelligence



Transmission Electron Microscope grid on which the copper-containing flake (dark piece in center) is mounted on solidified correction fluid (large gray area). Copper flake size is longer than 0.1 millimeter in longest dimension. [See article.]
Photo courtesy: Cincinnati Group

New Energy Times Archive

By Eugene F. Mallove, Sc.D.



Comets, Cold Fusion, and Alchemy

We live in an age of miracles. The news in this *Special Double Issue* leaves little doubt. Of the two items on the preceding page, I can't decide which is more "miraculous"—

• The long overdue, but *very welcome* letter from an important office within the U.S. Department of Energy, a formal statement that is highly supportive of cold fusion research—though not using the words *cold fusion* per se—there is *no* doubt that that is what they are writing about. Received by James Reding, CEO of Clean Energy Technologies, Inc., one of the emerging New Energy companies, the letter promises to send the energy-from-water (cold fusion) message throughout DOE and elsewhere!! Congratulations to those in DOE's Office of Energy Intelligence for their integrity. Perhaps this Office will now let everyone know that the DOE Cold Fusion Panel's Report of 1989 is indefensible, and that it is still being cited by the Patent Office to deny cold fusion patents. While they're at it, the Office of Energy Intelligence could look into why no one at DOE seems interested in the Claytor group's *low energy* production of *tritium* (at Los Alamos National Laboratory)—a strategic material.

or, another "miracle"....

• The visible piece of copper in a matrix of other elements that emerged from a low-energy transmutation cell that apparently substantially reduced the radioactivity of thorium in less than an hour, cold-fusion/fissioning it (without deadly radiation!) to a range of lower-mass elements. Moreover, some of these new nuclides have highly anomalous non-natural ratios among their isotopes. There is no possibility of contamination explaining that away. Thus, we have a simple process, validated in several laboratories already, that accomplishes in minutes or hours (for only pennies of electricity input) what Nature would take *tens of billions* of years to do. That is a genuine miracle—especially since more than 99% of the world's scientists would "know" *a priori* that such is impossible.

Well, they now will have NO valid excuse for not doing the experiment to check this out—no excuse but obstinate denial. The details of the relatively simple zirconium-chamber experiment and methods of data analysis are disclosed in this issue of *Infinite Energy*. They come from a group of inspired inventors in Ohio—*The Cincinnati Group* — which is also ***selling*** (hallelujah!) a Low Energy Transmutation Kit (LENT™-1), for those who want to get it right the first time with no fiddling around. The Cincinnati Group has applied for patent protection for its intellectual property and intends to license the process.

These Ohio inventors acknowledge their limitations. They are not trained scientists, they are clever mechanical and practical people—self-taught like the Wright Brothers. They knew very well, however, with which scientists to work and how to do experiments to develop a mountain of data that helped them make *repeatable* their transmutation experiments. We first came upon them two years ago, when they were in the early stages of this work, and were very impressed with them. They also have many other interesting energy-related technologies up their sleeves. We only wish that our own limited resources had then enabled us to help them more through difficult times.

A word about the claimed source of the Cincinnati Group's inspiration. These deeply religious, Christian people say they receive direct guidance from the Lord. On their web site (**http://web.gcis.net/cincygrp**) they prominently display bible scripture, Jeremiah 33-3, "Call to me, and I will answer you, and show you great and mighty things, which you do not know."

Without endorsing religious views or claims, to those snickering folks who are too quick to disparage this blend of science and "revelation," let me say, quoting Hamlet, that there are "far more thing in Heaven and Earth than are dreamt of in your philosophy." If the cold fusion saga has taught us anything, it is that we must be open-minded. Furthermore, let us recall the inspired work of Kepler and Isaac Newton in celestial mechanics. Both men were driven by intense religious passion—as have been many scientists of other faiths. In fact, we must now go back and study Newton's compendious alchemy writings very carefully. He may have left us a legacy as profound as what he gave us in dynamics, calculus, and and gravitation, but Newton's alchemy writings have been sidelined by the Establishment as an "embarrassment."

These transmutation results from Ohio, and *also* from CETI, which has another electrochemical radioactivity remediation process, have a lot to do with alchemy, but of the *modern* sort. They employ electrochemistry, not pure thermal energy input. CETI is about to receive a United States Patent designation (allowance of the patent has already been received). Its process was profiled in a landmark television broadcast by Dr. Michael Guillen, *Good Morning America*, June 11, 1997.

On that program, CETI revealed its long-duration hot water heating unit, pictured on the cover of this *IE*. It produces power *continuously* for *months* at 20% to 50% excess. It is in the power range: hundreds of watts to a kilowatt—affected by whatever power they wish to dial in. The recent CETI technology improvement is in duration and sustained high-power level. We hope that the staffing-up of CETI, reported in its newsletter, will lead to both duration improvements with *simultaneous* much higher power ratios—such as CETI has achieved in the past and is still able to do with other cells.

If it is virtually certain now that we are entering what I would call the *Modern Alchemy Age, w*hat do these wonders of cold fusion-cold fission (or *whatever* you want to call it!) have to do with comets—as in this essay's title? A lot. In recent times Earth people (and people and instruments in space) have been witness to spectacular comets—most recently, the very bright Hale-Bopp, which was so beautifully visible to the naked eye. Not far back we witnessed the cataclysmic collision with Jupiter of the fragments of comet Shoemaker-Levy. These were incredible events, but not as momentous to human civilization as what is happening in cold fusion.

Overlooked by the mass media, however, was another, probably much more important comet story. It may presage another revolution in planetary science as profound as the coming of plate tectonics and the for-decades-denied "impossible" motion of continents.

This other comet story has virtually all the hallmarks of the cold fusion controversy of the past 8-plus years. It had been a less well-known controversy, because it was not possible for

Continued on page 6

Infinite Energy Archive

Revealed to the World.....

Now....At Your Own University or Corporate Laboratory, Test the Low-Energy Transmutation Process for Remediating Radioactivity* in Natural Thorium—and Other Elements

*Radioactive Elements are converted to stable elements within hours, a process that takes Nature billions of years

The Cincinnati Group

is pleased to Announce the Availability of

A Low-Energy Nuclear Transmutation KIT — LENT™

Now taking orders for Fall 1997 delivery

U.S. and Foreign Patents Pending

The Radioactivity Remediation Kit, *LENT-1*, will include:

- Specially-Machined, Closed-Cell, Zirconium Electrolytic Chamber
- Full instructions for operation and evaluation of test results
- Technical Assistance

Optional Equipment

- Power Supply
- RM-60 Radiation Detector and Software for PC Data Collection

Guarantee: *This kit will produce verifiable Transmutations at Low Energy or Your Money Back*

- *Safety-Checked at Qualified Laboratories for the Absence of Hazardous Radiation Process is Aneutronic*

For price information, ordering, and kit availability, please contact:

The Cincinnati Group

P.O. Box 1262, Covington, Kentuckey 41012-1262

Phone: 513-244-1144 Fax: 513-874-6982

http://web.gcis.net/cincygrp

New Energy Times Archive

thousands of people all over the world to be conducting experiments on images from satellites! In cold fusion, by contrast, thousands of scientists and inventors *have* done experiments that will shake modern physics and chemistry to their foundations.

The comet controversy began in the mid-1980s. It involved the heretical interpretation of "black spots" in images of Earth's upper atmosphere taken by the Dynamics Explorer NASA spacecraft. To the now hero of the story, Prof. Louis A. Frank, the Carver/James Van Allen Professor of Physics at Iowa State University, it appeared that these spots were *real*, not just electronic noise. He had checked the noise explanation carefully, and found that it did not hold water. Dr. Frank suggested that these spots revealed the continuous bombardment of Earth by some heretofore unknown, fluffy, water-laden mini-comets. These would be house-sized, travelling at 35,000 kilometers/hour. He estimated that there were 20 of them falling into the atmosphere every minute—10 million of them a year! He said that they must deposit huge clouds of water high in the atmosphere when they disintegrate—thus, the occurrence of those black spots from Dynamics Explorer.

Though a highly respected and very well published planetary scientist, Dr. Frank was attacked and subjected to ridicule and worse during the past decade. He became an outcast. The mini-comet hypothesis raised a huge number of questions about accepted geological and planetary science—it profoundly threatened the reigning paradigm. For one thing, Dr. Frank concluded that the mini-comets had probably deposited enough water to fill the oceans, and may have injected Earth with organic ingredients required in the origin of life. There were many other problems raised by the small comet hypothesis, too numerous to mention here.

Nonetheless, Dr. Frank stood his ground. The incontrovertible data were *to him* far more important than (1) established theories that appeared to be violated, or (2) *possible* contradictions of other observations. We can thank him for his steadfastness. Last May, Dr. Frank presented images from the ultraviolet camera aboard a new NASA satellite, the Polar spacecraft. The data was now overwhelming that the black spots seen a decade earlier were real. Large numbers of geophysicists —even former opponents—were forced to concede that. The hiatus in scientific understanding and benefit to humanity was long-delayed by the obstinate clinging of scientist to *old theories* — even in the face of *strong new data* which contradicted those theories. It was easier for establishment scientist to ridicule or ignore those data. Virtually all science journalists fell right into step with the critics in the Establishment and ignored Dr. Frank. Sound familiar? Regular readers of *Infinite Energy* will know that this is the cold fusion story writ large, and the story of a major failure of science journalism— it just happens to be in another domain.

The comet controversy has been chronicled in an excellent book, *The Big Splash*, by Dr. Frank and science writer Patrick Huyghe (Birch Lane Press, 1990), who specializes in writing about scientific anomalies. The saga of Frank's observations and shabby treatment by his colleagues was more recently (July 13, 1997) the subject of a *Washington Post* "Outlook" piece by Dr. Frank and Mr. Huyghe.

In that piece (*get it at your library!*), Frank makes some beautiful observations: "The universe is what it is. I don't bury observations that stand in the way of conventional wisdom. I don't gloss over things I don't understand. I will not compromise my integrity. Unfortunately, this stance has made me the target of scientific vandalism."

What an extraordinary phrase—*scientific vandalism!* That is *precisely* how we should characterize many of the attackers and ignorers of cold fusion data. They are scientific vandals, ie. ethically, if not legal-

Continued on page 12

Institute for New Energy

is an international organization to promote new and renewable enegy sources. Its monthly newsletter is

New Energy News,

reporting worldwide on all facets of new and enhanced energy. Memberships in INE are $35 per year for individual, $60 for corporations & libraries, and includes 12 issues of *NEN*

Fusion Facts,

a monthly scientific newsletter covering worldwide research in the cold fusion phenomena.
Subscriptions are $300 per 12 issues.

Fusion Information Center
P.O. Box 58639
Salt Lake City, UT 84158

Also available, *Cold Fusion Impact in the Enhanced Energy Age*, a book about the near future of the world energy situation. Phone for information: 801-583-6232

ENECO

Invites you to attend...

ICCF-7
VANCOUVER
"The Best Ever!"

APRIL 19-24, 1998

ENECO is in the business of commercializing the exciting new field of low energy induced nuclear reactions in solids via patent licensing, joint ventures, and co-operative research.

ENECO

University of Utah Research Park 391-B Chipeta Way
Salt Lake City, Utah 84108 USA
Ph (801) 583-2000 Fx (801) 583-6245 jaeger@ENECO-USA.com

New Energy Times Archive

LETTERS TO THE EDITOR

Infinite Energy No. 12 may have been your best issue yet. If I may expound on what makes me read and re-read *IE*: No. 1 was earthshaking. It gave me the clear picture of the events and the contributors to the field I had been seeking. I had been making sporadic efforts since 1989 to get some ideas, but this was credible journalism from someone who had given up a position most people can't even dream of achieving, teaching at MIT.

Please understand that if I am asking a question, I am not meaning to introduce adversity. I take shelter in my relative ignorance, feeling that I cannot possibly threaten researchers with my questions and doubts, but I suppose it might just appear that way. I believe that I am representative of a pool of potential interested people (possible *Infinite Energy* subscribers), who want to understand. I am willing to risk the investment of time and effort, believing that even if I only gain rudimentary knowledge of the subject, I have not lost anything. Most people, however, do not wish to make such time investments unless a sure-thing arises—such as a good stock tip or a career boosting opportunity.

Gaining knowledge for the sake of understanding important things is an awfully broad motive that yields personal satisfaction, but cannot promise more. I do not wish to encourage you to pander to base motivation, but I would wish to see some clear direction on mid-career course change. Money is not my main motive. I want to be involved in something that is not dominated by the government, something where original thinking is not a liability, something that could really improve the world.

I would appreciate some tutorial articles elaborating on subjects like electrochemistry, materials science, stoichiometry, statistical error analysis, and plasma physics (to name a few), with textbook references for further study and perhaps some articles for downloading from websites (preferable for me at least, since I am not able to borrow from most libraries). Many of the authors of articles do presuppose a fair knowledge of the subject, so at least a glossary sidebar would be helpful. A partial list for T. Claytor et al.'s work might include: scintillation counter, the different methods of analysis (SIMS, NAA, EDS and AES) strengths and weaknesses, sputtering, drift rates, stress relieving vs. annealing, work hardening, and hydriding vs. loading, These terms were taken from the quite readable paper published on http://wwwnde.esa.lanl.gov/cf/tritweb.htm.

I believe that I am right to encourage you to popularize other competing sources of information besides *Infinite Energy*, from a competitive standpoint. It seems likely that survival of your enterprise depends primarily on success of CF, etc. As good as the Internet is, the published document has a niche that will not soon fade away.

Social reality is a strange thing. People are pouring money into an over-valued stock market that they cannot possibly understand. Money that represents work and sacrifice is a personal investment. Yet, how few will make a much smaller personal investment to even try to understand the issues of CF? What my attempts at convincing someone of the importance of trying to understand this stuff usually meet is a questioning of my motive. And then whether I could really understand it as well as I claim. I suppose that most are trying to figure why I would bother, where is my payoff? To such common jaded attitudes, I cannot respond but that knowledge is its own reward. If that means getting fooled by those who have fooled themselves, I am no worse off for trading an interest in politics for an interest in new science (a crude comparison if ever was, no offense intended, simply a worst case analysis).

Reactions often range in the "It's too complicated for me" category, with which I can certainly sympathize. But such people often will invest untold hours in pursuit of some fictional nemesis through scenarios of perhaps greater complexity in a popular novel. Go figure! "Why shouldn't truth be stranger than fiction? Fiction, after all, has to make sense" (Mark Twain)

In this arena, we have to make the sense.

Ed Wall
On the Road Somewhere in the the USA

•—•—•

Dear Dr. Mallove,

I received your message about the ABC-TV Cold Fusion / transmutation. Thank you. Yes, I am glad to see that this technology becomes open for world-wide innovation. On the other hand, I am sorry that in Russia it was not developed from 1960 when Mr. Ivan Filimonenko demonstrated his system for the Soviet government.

But in my opinion, people who really wish to introduce this technology in our life as the normal way for energetics, must develop it in several countries at the same time. If you'll develop it in USA only, it creates many international problems. International cooperation is only way in this process.

I do not agree that American scientists had the first claim to cold fusion results, but I am sincerely glad that American business people have the possibility of developing an "idea" into "reality." It is a serious advantage to your country if business interests can move technologies, and the USA in the history of civilization demonstrated many times that it is as place for realization of ideas. Russia in this sense is the country where many great technological ideas were born, but did not find demand because there were no serious business structures interested in new markets.

Please, pass my congratulations and best respects to Dr. Patterson and his partners. If his group needs helpers in St.-Petersburg, I am ready to work with them.

Alexander V. Frolov
Expert of Russian Physical Society

•—•—•

Dr. Mallove,

I wanted to thank you for writing the Analog article about cold fusion. I was astonished to find that so much progress has been made in a field that I had thought was abandoned.

••SPECIAL NOTICE••

IF YOUR SUBSCRIPTION BEGAN WITH ISSUE #9 *AND YOU HAVE NOT YET RENEWED*,

THIS IS YOUR LAST ISSUE of *INFINITE ENERGY!!!*.

DON'T DELAY—RENEW YOUR SUBSCRIPTION *NOW!*

ENJOY ANOTHER YEAR (SIX MORE ISSUES) AT THE SAME LOW PRICE....STILL ONLY... $29.95 FOR NORTH AMERICA $49.95 FOR OTHER FOREIGN

www.Infinite-Energy.com Archive

I visited your web site also. I have been a subscriber to *Analog* for many years and a subscriber to the weekly "Science News" magazine. It is ironic that I learn about the most important science development in my lifetime from the science fiction/fact magazine. What's next? Snowballs hitting the atmosphere? <grin>. I know you are a busy person, so you need not reply. Thanks again!

Steven Cosgrove
From Cyberspace

• — • — •

I belong to those persons who never thought cold fusion was dead and buried forever, and I was truly pleased to find a lot of cold fusion life on the Internet. To say the least, this is an enormous matter and has the potential of causing a total revolution in our world! It is extraordinary that so few people know about this, and that the general belief is that cold fusion does not exist. Therefore, I wish to become as well informed as soon as possible. I found your name in one of the publications, and understand that you are publishing a magazine in this very field. I would be most grateful if you could advise me how to proceed, and please also send information about your magazine. I am employed by Neste OY, which is an energy company based upon oil and gas and active mainly in the north of Europe. Our annual sales amounts to 10 billion US dollars and we are eagerly looking for new ideas in the energy field. Cold Fusion seems to be of adequate magnitude to fulfill any of the criteria set upon potential ideas. Currently I am representing our company in East Asia and I am normally stationed in Shanghai.

Looking very much forward to hearing from you.

Peter Flander
Corporate Vice President, East Asia
Neste OY

It is wonderful to hear from an open-minded realist within a major oil and gas company. I am sure we will be hearing from many more fossil fuel people soon—for their sake, before it's too late! —EFM

• — • — •

Dr. Mallove,

I thoroughly enjoyed your article in *Analog-Science Fiction/Fact* for July-August 1997. I would like to have information on *Infinite Energy Magazine*, subscription rates and number of issues/year.

I worked for 40 years in the DOE Oak Ridge Facilities and was fortunate enough to obtain a copy of the original Pons and Fleischmann paper that was FAXed all around the world. To me it was the most exciting discovery since the discovery of fire. DOE/Oak Ridge did not respond in the manner that I expected, or thought they should have.

Before retirement, I read all that I could when I had access to scientific journals, especially *Fusion Technology*. But after retirement, I no longer had access to the journals and I can't afford their $200.00/year cost.

I have your book on Cold Fusion.

Paul J. Long, Ph.D.
Friendsville, Tennessee

Good News, Dr. Long! Infinite Energy is only $29.95/year for folks in Friendsville. Yes, as cold fusion begins to move into the mainstream, we keep hearing more sad stories about the DOE malfeasance in 1989.—EFM

• — • — •

Dr. Mallove,

Thank you for the help you gave us on specific pronunciations in your article, "Cold Fusion: The 'Miracle' is No Mistake." As I write this, we are recording the article as part of our production of the July/August 1997 issue of *Analog*.

The recorded magazine will be distributed, as is all the work we do, through the National Library Service for the Blind and Physically Handicapped (NLS), a department of the Library of Congress. The magazine will comprise a series of thin plastic discs, which are played on a special record player. Both discs and player are provided free of charge to qualifying NLS patrons.

The enclosed pamphlet, "Projects & Experiments," gives an excellent overview of the purpose and operation of NLS, as well some background on its affiliated studios, such as ourselves. I think you will find it informative. Thanks again for your assistance.

Jim Hermanson
Talking Book Publishers, Inc.
Englewood, Colorado

Thank you, Jim. We already were in the business of trying to inform mentally "blind" scientists, journalists, and politicians about cold fusion, so it is good to hear that we will soon be appreciated by the physically blind community.—EFM

• — • — •

Dr. Mello,

I drive a truck and the night I heard you on the Art Bell program [June 10-11, 1997] my radio was fading in and out. I couldn't catch everything, so I apologize if I have not got your name right.

I am very interested in alternative energy and was quite surprised to learn that the cold fusion problem has been technically solved. I would be very interested in learning more about that. Also, could you send subscription information for your magazine. Thank you so much for your time.

Launce B. Kramer
Lower Salem, Ohio

Launce, I have been called worse names before. Welcome aboard — and let's hear it for cold fusion-powered 18-wheelers!—EFM

• — • — •

I don't know how I could help. I do know that it a long past time for a practical alternative to burning carbon. I am just old enough to remember farm life without electricity. The utility companies didn't want us. Some of the more progressive farmers had wind generators. And I suppose it was only a matter of time before folks got independent and decentralized. At any rate, the utilities got R.E.A. [Rural Electrification Administration] federal free money, got everyone hooked up on a cheap rate, then raised the rate.

At any rate, I have grown to despise the government-sponsored monopoly and economic entrapment. So I say again, it is a long past time utility customers had some alternative. Please send me back issues #7-#12.

Edgar Chrisman
Nevada, Missouri

Mr. Chrisman, we hope that New Energy technologies will have you all off grid. Then you can tell the REA where to go.—EFM

• — • — •

As is obvious from the envelope's return address, I am in prison. For some reason this COLD FUSION idea has sparked something within. I hope to get out of here someday, so I will need money to live and continue my artistic goals. I have been able to save about $500 at this point and should be able to save that much per year until I leave. If that is enough to invest, then I will give further consideration to doing so. If the amount is not significant enough, I understand and wish all the Best.

I know deep down that there is a source of energy that man has yet to discover—or maybe has now a glimmer of—that is incredible, amazing, world changing.

Laughter and light,

J. M. Carrigan
Salem, Oregon

Thank you for your sincere, soul-warming letter. Unfortunately, in the beginning investment in cold fusion and new energy technology will be in privately held companies or funds for qualified investors—those whose incomes and net-worth would allow them to invest significant sums. However, there will certainly be ways for even the small investor to participate when the cold fusion and new energy companies and funding groups are offered to the public within the next few years. Hope you are free by then!—EFM

New Energy Times Archive

I am very interested in investing in cold fusion, but funds are strictly small potatoes. I have a few women who may also be interested, as I have shared your magazine with them. Exciting and fascinating even to a non-scientist retiree with an open mind!!!

Many thanks for your marvelous efforts in this and these endeavors. I, for one, wish you all the greatest success in the challenges ahead. Your [investing] info kit will be awaited with eager anticipation. I but grasp the generalities somewhat (!) and the intricacies not at all!!! Again, thanks for the efforts for all in the fields of research for their oftentimes thankless work.

Molly Y. Blaisdell
Ingram, Texas

Thank you, Molly! Your kind expressions let us know that we are doing our job — a difficult one of providing a smorgasbord of information from the popular to the technical. "Something for everyone!" Our job is not thankless, when we receive thanks from people like you.—EFM

As I was reading an article in *Physics Today*, May 1997, entitled "Why Would Anyone Major in Physics," by R. Ehrlich, I remembered your Editorial "Is New Physics Needed?" in the 11th issue of your most impressive—intellectually honest publication.

You and your strongly inter-linked composite of scholars can now provide some of the best of all answers to Ehrlich's question. Publish your findings in both *Physics Today* and *Infinite Energy*. You are correct in calling for a New Curriculum to be generated over a period of decades by the very brightest students who today must decide to accept the exciting challenge of pursuing the truth in the world of physics. As you know we are talking here about a love story; the good students fall in love with physics, mathematics, and the other arts and sciences.

I would be pleased to offer you my assistance in the preparation of the "New Editorial." I will soon have my own (WEB Site) and (E-Mail) address; which could expedite any necessary exchange of communications relative to the project. Keep up the very good work!

The "Fleischman Interview" was superb. (It is sad that he never made friends with a teacher who was manifestly in love with PHYSICS. Brilliant people like Fleischman could easily have acquired all the requisite skills to appreciate and to incorporate PHYSICS into their professional lives.

This again reflects a poor curriculum during the 20th Century....*The Age of Technology,* based most likely on the wrong Laws of Physics (as you properly suggest in your prophetic Editorial). Let's soon unify all this disparate information.

(PS) Lets talk directly to students everywhere... our future giant global market...

Raymond C. O'Rourke, Ph.D.
LaJolla, California

I am glad that you liked my editorial in Issue #11. Unfortunately the physics establishment is still "at war" against cold fusion, as often happens in great paradigm shifts, so I honestly conclude that nothing of a positive nature on cold fusion—or on any other extremely heretical physics—will be published in Physics Today. But we couldn't agree with you more about the need for a new physics curriculum that will encompass challenges to "received wisdom." Yes, the younger people constitute the largest global marketplace for new ideas.—EFM

I want to thank you for your promptness in shipping the back issues of *IE*. You have a fascinating magazine.

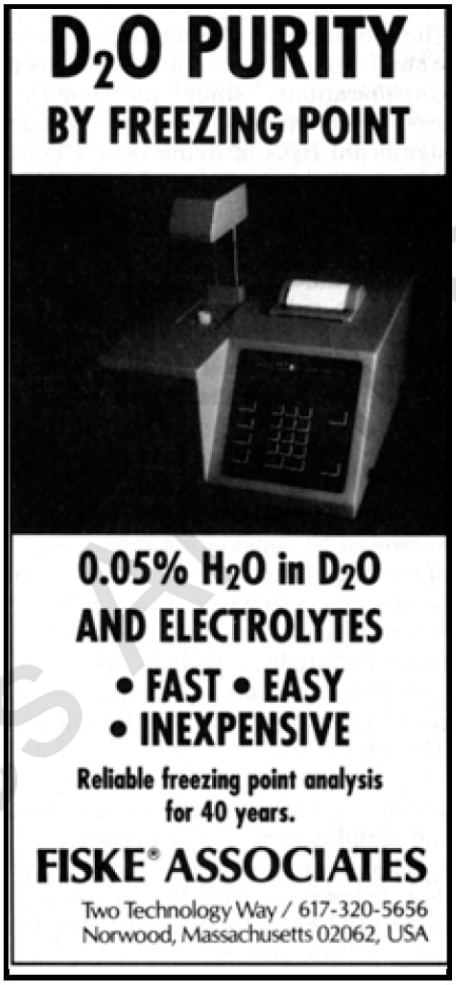
After reading about the carbon arc process, I have decided to build a prototype. It would appear that the carbon arc process is far superior to cold fusion. Cold fusion seems to be unpredictable, (researchers seem to get varying results), and it only produces hot water. On the other hand the carbon arc produces not only hot water, but a valuable fuel and intense illumination for photo cells. In addition, the results are predictable.

It is far more difficult to turn hot water into electricity via steam than to feed the fuel gas into an off-the-shelf IC engine .

It is to be hoped that future issues of *IE* will devote at least as much space to the carbon arc as to cold fusion. Issue #12 was devoted entirely to cold fusion. Cold fusion leaves me cold. Keep up the good work and again thanks,

Ronald Brennan
Weirsdale, Florida

We will certainly continue to cover underwater carbon arc technology in future issues. While it is good to appreciate the obvious immediate application of carbon arc technology to internal combustion engines, let us not forget that the real utility of the process depends on being 100% sure that there is significant gain—over unity effect—in the process. Previously published data in this magazine certainly suggests that, but we want to be 100% sure, and we hope that we will be! (D_W Research will be providing us with a demonstration unit soon to perform those tests.) Also, we suggest that the carbon arcs may be part of a continuum of low-energy nuclear phenomena that include both heavy and light water cold fusion as well as transmutation–cold fissioning—of radioactive materials to harmless products.—EFM



With reference to the letter by Ashley Gray in *Infinite Energy* #12, Jan.-Feb. 1997: In that letter Mr. Gray reported experiencing a phenomenon of distorting a sort of boundary condition and obtaining excess energy for short or specific periods of time, but then having the device return from that overunity-producing state back to its normal rest state with no excess energy output.

There is indeed such a phenomenon involved in some overunity devices, and it (or a closely related phenomenon) has been dealt with to some extent by Aharonov. See Yakir Aharonov, "Non-local phenomena and the Aharonov-Bohm effect," in *Quantum Concepts in Space and Time*, Eds. R. Penrose and C.J. Isham, Clarendon Press, Oxford, p. 41-64.

I believe Mr. Gray may have encountered Aharonovs modular variables. These are sometimes encountered in nonlocal phenomena, and nonlocal phenomena are definitely involved in the overunity process, since the overunity system is open and receiving energy from its external environment (such as the active vacuum).

Aharonov points out that, when modu-

LETTERS Continued, Page 58

New Energy Technologies Investment Fund to Start in 1997

The long sought investment fund for cold fusion and new energy technologies that *Infinite Energy* magazine editorially proposed in Issue #9. is about to be launched this year. A single highly-qualified investor has promised a minimum of $1 million dollars to launch the fund, with the possibility of that investment going as high as $5 million. He wishes to remain anonymous, for now. He is the former head of a large U.S. corporation.

Several other qualified private investors have also come forward, so momentum is building for the fund to become legally established within the next few months. The goal is to raise at least $10 million.

An outstanding CEO who will lead the fund has come forward, after doing considerable due-diligence investigation of the various start-up companies and technologies in the field. Dr. Daniel Cavicchio of Greenwich Venture Partners in Greenwich, Connecticut is the man of the hour.

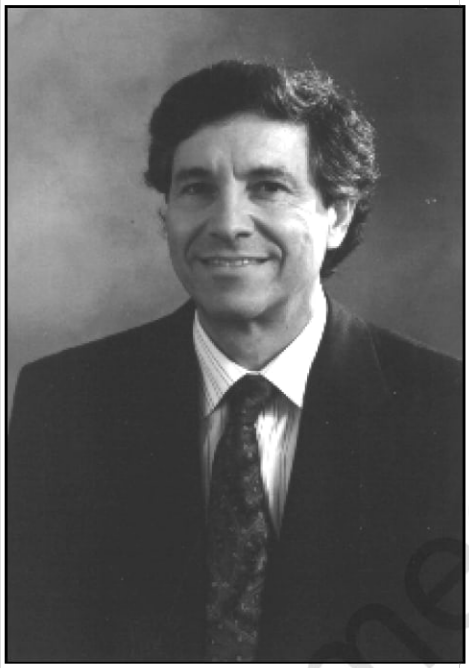
He brings a tremendous breadth and depth of experience from his educational background, fund raising, and corporate management activities. We reprint his biographical summary on this page.

The aim of the New Energy Technologies Fund (which was code-named "SuperPower, Inc." in Issue #9) is to be an initially privately held capital resource pool for shared-risk investing in a variety of emerging New Energy Technologies relating to excess energy devices, transmutation, radioactive waste remediation, etc. These generally coming under the rubric of novel technologies that promise to accomplish what more-established physics has said is "impossible," but for which ample experimental proof now exists.

A variety of consultants in science and engineering will be working to provide expert advice to the financial managers of the Fund. Among them will be the principals of Cold Fusion Technology, Inc. of New Hampshire.

DANIEL J. CAVICCHIO, JR.

Mr. Cavicchio earned his B.A. degree in mathematics (minor in physics) at Rensselaer Polytechnic Institute in 1966, where he graduated first in his class. He received a full fellowship to pursue graduate studies at the University of Michigan, where he earned an M.S. degree in mathematics, an M.S. degree in Communication Sciences, and a Ph.D. in Computer and Communication Sciences.



Dr. Daniel Cavicchio of Greenwich Venture Partners to head New Energy Technologies Investment Fund

In 1970, Mr. Cavicchio joined the technical staff of the Aerospace Corporation. In 1973, he joined the management consulting firm of McKinsey and Company. At McKinsey he became an Engagement Manager and consulted for technology-based companies in such areas as new product and new business development, management of R & D, acquisitions, product/market strategies and profit improvement. In this capacity, he served a number of Fortune 500 companies, including AT&T, Western Electric (now Lucent Technologies), General Electric, CBS, Corning Glass, and Hooker Chemicals and Plastics, a subsidiary of Occidental Petroleum.

In 1978, Mr. Cavicchio joined American Can Company as Director, Business Development. He was responsible for directing the efforts of internal business development and acquisition programs, initially in the Packaging Sector and later as head of the acquisitions department for the Distribution/Specialty Retailing Sector.

In 1984, Mr. Cavicchio co-founded Greenwich Venture Partners, Inc., a buy-out firm specializing in turnarounds of technology-based companies. This firm was funded with the partners' own capital. As Chairman, he personally conducted all aspects of the acquisition process, including identification, negotiation, due diligence and closing. After closing, he personally operated each company through its transition to profitability. Major portfolio companies include the following:

Commonwealth Sprague Capacitor, Inc., a power capacitor business acquired in 1986 from Sprague Electric. Over the past ten years, sales have been increased from $10 million to $20 million with pretax return on capital employed averaging 50%. Results were accomplished by accelerating commercialization of new technology, renegotiating union work rules, upgrading management and financial reporting, establishing joint ventures in Brazil and India, and introducing new products. One of the new products established market leadership in one year against major Fortune 500 competitors.

Spectra Optics Incorporated, a defense electronics company, was acquired in 1993. Sales were increased from $1 million to $3.3 million and operating profit was increased from a $300,000 loss to a 13% pretax margin. Instrument costs were reduced dramatically and strategic alliances with other defense contractors were established. The company is now positioned for rapid growth in chemical warfare detection, environmental monitoring, and drug detection applications. Each of these companies is now being run by a new management team with Mr. Cavicchio serving on the Board of Directors.

Mr. Cavicchio is listed in Marquis' *Who's Who in the East*. He lives in Greenwich, Connecticut, with his wife, Brenda, and his two sons, John and Keegan.

PROPOSAL ON NEW ENERGY TECHNOLOGIES

A draft Memorandum is available to determine interest on the part of certain accredited investors in investing in a fund or company, which will in turn invest in early stage companies that have developed revolutionary new energy technologies.

THE INFORMATION CONTAINED IN THIS ARTICLE AND IN THE PROPOSAL IS FOR DISCUSSION PURPOSES ONLY AND DOES NOT CONSTITUTE AN OFFER OR SOLICITATION OF INVESTMENT. ALTHOUGH THE INFORMATION CONTAINED IS FROM SOURCES CONSIDERED TO BE RELIABLE, THE PROSPECTIVE READER IS CAUTIONED THAT THERE IS NO REPRESENTATION AS TO THE COMPLETENESS OR ACCURACY OF THE INFORMATION CONTAINED IN THE MEMORANDUM.

Parties interested in receiving the Memorandum should contact: Daniel J. Cavicchio, Jr., Greenwich Venture Partners, Inc., 8 Sound Shore Drive, Suite 100, Greenwich, CT 06830, Telephone: 203-629-4447, Fax: 203-629-4848.

New Energy Times Archive

A *must read* book—Order your copy today from Cold Fusion Technology, Inc. !

Newton versus Einstein, by Peter Graneau and Neal Graneau. Carlton Press, 1993 Hardcover. 219 pages, $14.95. ISBN 0-8062-4514-X

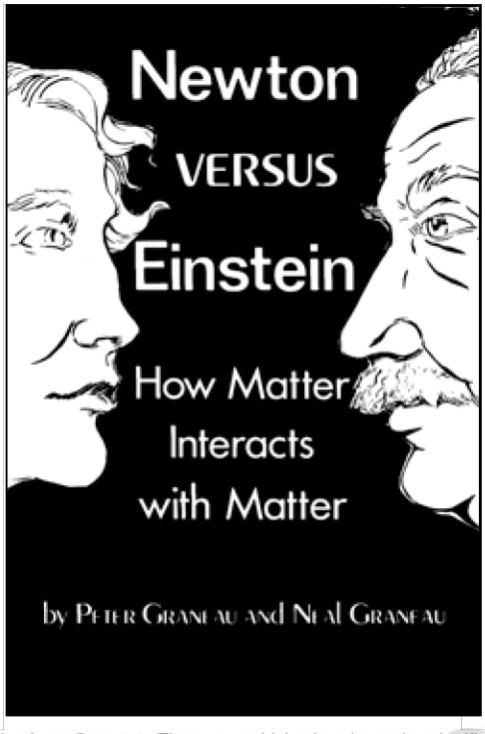
NEW TECHNOLOGY!

NEWTON versus EINSTEIN is not merely a critique of contemporary physics. Nor is it just an outline of the clash of philosophies. It points the way to new technologies from space accelerators to high-current switches and improved metal refining. Most exciting is the discovery of how to gain solar energy from ordinary water via the release of intermolecular bonding energy, as recently explained in *Infinite Energy* (Issue #10) and featured in a forthcoming BBC-TV program. It could become as important as the discovery of nuclear energy, yet be benign to man.

Praise for Newton versus Einstein

Inertia is a much-discussed topic. The Graneaus give a beautiful account in which they relate theories of inertia back to those of Mach at the beginning of the century. They view inertia as the result of the gravitational interaction of all particles in the universe on the body in question, instantaneous transfer making even distant galaxies a part of the interaction .

The authors feel, correctly, that there is a resemblance between the Academies of Science at present and the influence of the Church at the time of Galileo. There is effective censorship of ideas inconsistent with



the I926 Quantum Theory or which play down the significance of Relativity. If new observations do not agree with the present physics, the investigator is accused of fraud or sloppy science....

But now, the authors believe, the dust has settled and there are too many aspects of present physics that seem inconsistent with observation. The time has come for a Great Re-Think. There is a telling quotation from Einstein in a letter written towards the end of his life to his old friend Besso. It states that field concepts may be entirely wrong. If they are, Einstein says, then all his endeavors and the rest of modern physics are up for re-forming.

This little book is the expression of workers who really do try to penetrate into the darkness, instead of singing the old song in a new style. But scientists like the Graneaus will never win the Nobel Prize. They ask too many disturbing questions to obtain the support of the establishment scientists who decide who gets the Prize.

Professor John O'M. Bockris,

JOURNAL OF SCIENTIFIC EXPLORATION, Spring 1995

ABOUT THE AUTHORS

Peter Graneau is well known for a long series of experiments in classical electrodynamics performed during thirty-five years in university and industrial laboratories on both sides of the Atlantic. The results he obtained were consistent with the old Newtonian electrodynamics which flourished in Europe during the nineteenth century. Dr. Graneau has published his findings in more than forty papers in prestigious physics and engineering journals and in his 1985 book *Ampere-Neumann Electrodynamics of Metals*. Some of his work has been sponsored by the U.S. National Science Foundation, which commended him for his efforts. The Graneaus make their home in the town of Concord, Massachusetts. They love nature, and they walk and canoe where Henry David Thoreau lived. In this beautiful area, Peter Graneau has time to contemplate the course physics may take in the next century.

Neal Graneau was born in London, England, and attended Fenn School in Concord, Phillips Exeter Academy in New Hampshire, and Winchester College in England. He traveled with school theater and poetry groups, and played piano recitals. Neal Graneau studied physics at King's College of London University, and at Oxford University as a graduate student. He is currently a full-time researcher at Oxford. For ten years, he spent his summers in his father's MIT laboratory. There this father-and-son team researched, invented, built and performed the experiments described in this book. When not at work, Neal finds time to relax by playing the drums in an Oxford group.

Newton versus Einstein
ONLY $14.95 + $5.00
shipping (in North America)
$14.95 plus $12.00 air mail (all other locations)

Cold Fusion Technology, Inc.
P.O. Box 2816, Concord, NH
03302-2816
Or, Fax Credit Card Info to:
603-224-5975

EXTREMELY TIMELY VIDEO UPDATE!

COLD FUSION & NEW ENERGY BRIEFING

Recent Breakthroughs, History, Science, and Technology

2.5 Hour Video Taped Lecture & Seminar by Dr. Eugene F. Mallove,
Editor-in-Chief of *Infinite Energy*
Delivered at Rutgers University, DECEMBER 10, 1995

What happened to "cold fusion"? Didn't that die in 1989 when the U.S. DOE said it was nonsense? If you believe that, you are a good friend of the Tooth Fairy! Find out what really happened and what is continuing to happen. Hear Dr. Mallove "tell it like it is" and demolish the Big Lies against cold fusion. ***AND***, get the details on "HeavyWatergate"– The DOE/MIT-PFC/Media scandal.

(2) VHS Tapes, ONLY $49.95 for U.S. and Canada, ($64.95, other foreign).
•Price Includes Air Mail Shipping•

Send Payment to:
Cold Fusion Technology, Inc.
P.O. Box 2816, Concord, NH 03302-2816
Or, Fax Credit Card Info: 603-224-5975

New Energy Foundation Archive

"Breaking Through" continued from p.6

ly—criminals. [One such senior con-artist and *science vandal,* Dr. John Huizenga, is in the news again in our *Briefs* section, after his travels were featured in *Issue* #12.] Huizenga and his ilk, such as some of the hot fusioneers at MIT, not only *in effect* stole money in the form of Federal budget dollars that continue to be wasted on the doomed tokamak fusion enterprise, but they stole HOPE away from the unsuspecting citizenry of this planet. They stole *hope* for, and delayed implementation of, energy independence and an environmental renaissance. That is the vandals' most serious crime.

Dr. Frank wrote in *Outlook*, "Scientists reacted to my announcement as if I had plowed through the sacred field of established science with a bulldozer. I had." Reacting to *Nature* magazine's lunatic methods for judging his work, Dr. Frank wrote, "It was my first encounter with taking polls as a way of doing science." He should know that not only did *Nature* use the "polling method" to "peer review" cold fusion science, it also used the authors of challenged "null" cold fusion papers (e.g. the Caltech work) to reject any scientific correspondence critical of those papers.

Following the July 13 *Washington Post* piece by Frank and Huyghe, we have one of Frank's critics, Dr. Alexander Dessler, a

Continued, Page 120

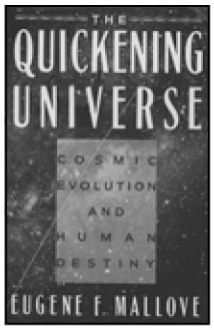
Published by the
Fusion Information Center
P.O. Box 58639
Salt Lake City, Utah
84158-0638

A Quarterly Journal
Hal Fox, Editor

Subscription:
$150 for 4 issues
Single Issues: $45

Read Eugene Mallove's
The Quickening Universe: Cosmic Evolution and Human Destiny

"A wonderful philosophical and reflective essay on the nature of the universe as informed by modern science. It is a fine example of how scientific discovery helps shape one's world view in a rational yet compassionate manner."
—the late Heinz Pagels, Ph.D.
Physicist and former executive director of the New York Academy of Sciences and author of *Perfect Symmetry* and *The Cosmic Code*



1987, St. Martin's Press, hard cover, 268 pages, illustrated by the author.

What Gene Mallove was writing about—*before* cold fusion and New Energy!

READ *THE QUICKENING UNIVERSE*
Order your inscribed copy today:
Send **$19.95** (U.S. and Canada);
($24.95, Other foreign , check or credit card. (Fax: 603-224-5975)
Cold Fusion Technology
P.O. Box 2816
Concord, NH 03302-2816

An Invitation to Explore the Frontiers of Knowledge

The international *Journal of Scientific Exploration* was established in 1987 to provide an unbiased professional forum for research and discussion of topics outside the conventional disciplines of science. Published topics have included anomalies in physics and astronomy, psi-phenomena, medicine, UFO's, astrological claims, cryptozoology, reincarnation investigations, etc. The goal of the journal is to make available high quality reports, reviews and commentary for use by researchers, teachers, students, and the general public. JSE is published quarterly. For further information contact:

JOURNAL OF SCIENTIFIC EXPLORATION
ERL 306,
Stanford University
Stanford, CA 94305 USA
Telephone: 415-593-8581
FAX: 415-595-4466
Annual Subscription Prices
(four quarterly issues)
$40 - Special First-Time Personal
(foreign add $5.00)
$50 - Regular Personal Renewal
(foreign add $5.00)
$100 - Institutional
(Institutions may request invoice)

America's ONLY Inventor's Magazine!

Inventors

DIGEST

Since 1985 ***INVENTORS' DIGEST*** has been giving inventors —just like you — the information they need!!! Every good idea deserves a chance...but where to start?
Take advantage of our special subscription offer and your questions will be answered!

•••••••• 1-800-838-8808 ••••••••

SPECIAL NO-RISK OFFER!!!
Call today and we'll put your first issue in the mail...take a look...you're under no obligation (except to your invention!)!!!
Six issues per year. Subscription rate: $22/yr.
INVENTORS' DIGEST, 4850 Galley Rd., Ste.209
Colorado Springs, CO 80915

New Energy Times Archive

Transcript of ABC-TV "Good Morning America" Program on Cold Fusion Excess Energy and Radioactivity Reduction: June 11, 1997

(Prepared by *Infinite Energy* Magazine)

Note: This Good Morning America program segment aired across the United States beginning shortly after 8:15 a.m. in the eastern US . At 8:15 a.m. anchor person Elizabeth Vargas said matter-of -factly: "Coming up next, Science Editor Michael Guillen will have an update on a revolutionary power source—one that could make pollution a thing of the past..." The high--profile story was also announced at 8:01 by anchor Charlie Gibson, who at 8:16 (after an intervening segment , the news, and weather) reiterated his lead-in to the story:

8:01

Charlie Gibson (announcer):

Also Michael Guillen is going to be with us. About a year ago—February of last year [Feb.7, 1996]—he introduced to us, on a piece in this broadcast, to a man named James Patterson. Mr. Patterson had a none-too-modest claim. Mr. Patterson claims that he has come up with the source for cheap, renewable energy that will solve the world's energy problems. I mean that's not too small a claim, is it? Anyway, scientists have had about a year since that first announcement of Mr. Patterson's discovery—scientists have had about a year to check out his findings and Michael's going to give us an update on just how they are panning out.

8:16

Charlie Gibson (announcer):

A little more than a year ago, we introduced you to an inventor who had come up with something getting a lot of attention. But its promise to transform our lives was tempered by the fact that it seemed to defy the laws of physics. Well, we got a tremendous response to that story that we did, and our science editor Michael Guillen is back with an update on this device and its creator.

Dr. Michael Guillen:

Big time response: we get letters all the time about this guy. He is Dr. James Patterson -- who we introduced last year. Seventy five years old, an inventor with 150 patents under his belt, including one for this little device, which he calls the Patterson Power Cell. It's really simple in concept. You have two electrodes here which you attach to electricity, you zap it with electricity, all the while you flush it with salt water, Charlie. But at the heart of the power cell are those little beads. Can you see them in there? I've taken some out and put them on the plate. [Camera zooms in to plate.] Okay, these are his little beads. They are plastic coated with various layers of metal. There is a lot going on in those beads! And even though this device doesn't look like a lot, Charlie, as you are about to see, it has come a *long* way in the last year.

[Film clip begins]

Man fishing: You got that one, you got that one, alright . . .

MG: Last year, when we first met Dr. Patterson, he was either out on the water fishing, or in his old garage tinkering. Hard to imagine anything earthshattering happening here. And yet today that old garage is a full-fledged modern laboratory, and Dr. Patterson is more optimistic than ever that his device will one day make fossil fuels obsolete.

James Patterson: We are getting nuclear energy output without the nuclear radiation byproducts.

James Reding: Michael, let me show you our hot water heater prototype.

MG: Oh, that's great!

MG (voiceover): Three years ago, young Jim Reding left Wall Street to market his grandfather's invention.

JR: Well, here it is. This device is producing more energy than it is consuming. In fact it is fifty percent more efficient than what people have in their homes today.

MG: Boy, this thing is really cooking! That's steam. Now, when will this be available for the consumers to buy?

JR: We expect the device will be available two to four years from today.

MG: So, right around the turn of the century? Perfect timing!

JR: That's what we hope.

MG (voiceover): During the last year, Patterson's little beads have led to a huge surprise. Not only do they produce heat. It turns out, they also neutralize radioactivity.

JP: This is the cell system down here . . .

MG: It sounds like such an amazing development, the company is attracting big name scientists, like Norm Olsen. He traveled all the way from Hanford, Washington, where the government stores billions of gallons of high level radioactive waste.

Norman Olsen: If this technology works out as advertised, it means we could significantly reduce the radioactivity of nuclear waste in the United States, and the world.

MG: But does it work as advertised? We decided to put it to the test.

JP: What I have in this cup is radioactive uranium in a water medium.

MG: And that's what's sending that Geiger going crazy, right?

JP: Yes.

MG: So the idea is that the radioactive material will then flow through your device, and actually remove the radioactivity?

JP: Yes.

MG: I don't believe it. Go ahead and push the button. Let's see if it works.
(Laughs.)
MG (voiceover during time lapse shot): The experiment began at high noon, with the Geiger counter registering well over 300. But by speeding up the video, you can see that after a couple of hours, the radioactivity was cut down by more than half -- a reduction that would take billions of years to happen
naturally.

NO: I am really encouraged by what I have just seen. Our plan now would be to take it back to Hanford Labs, test it out under controlled circumstances, and fully prove it. And go as far as we can go with it.

JP: I am doing something very good for society. I am accomplishing something for society. This gets me up early in the morning. In fact, it interferes with my fishing . . . [video clip of fishing]

[Return to studio]

CG: Alright, so you send electricity through this, and these little beads produce more electricity [sic] [Ed note: should be heat energy, not electricity.] than you send through.

MG: Yeah, a hundred to a thousand times more at its maximum output. But with this hot water heater they are developing -- by the way, they partnered up with the world's largest hot water heater manufacturer -- they are not so concerned about producing hundreds or thousands of times more energy, they are more concerned about it lasting a long time. So it is only producing about 120% more energy than it is consuming.

[Note: this means total output is 2.2 times input; excess is 1.2 x input.]

CG: Is there something here?

New Energy Times Archive

MG: I find it intriguing. You know, I am skeptical in the sense, Charlie, that I am curious, critical, but I am not close minded. And what is interesting is that last week, they attended the American Nuclear Society [conference] which is the conservative bastion of nuclear physics, and the device was very well received. They have been invited to next years conference. Motorola, Westinghouse, the Department of Energy, are all showing big time interest. Southern California Edison, Long Island Lighting, are all beating a path to their door. It is a story we are going to keep track of. **[End]**

Editor's note: Despite the admirable high-profile treatment of this story by ABC-TV, not a *single* mainstream news outlet followed up that week on what Dr. Guillen had presented. This, even though we at *Infinite Energy* were able to alert dozens of news organizations and top science journalists that the program was about to be aired. Sad. See in this issue of *IE* our review of the book *Field Guide for Science Writers* the "Official Guide of the National Association of Science Writers," in which the myth is perpetuated that cold fusion is nonsense. —EFM

Do it—please!

Write a letter about cold fusion and new energy to your Congressman, Senator, President, favorite Candidate, or Prime Minister.
THEN—Send it to *IE*—
We may very well print it!

Why not give
INFINITE ENERGY
as a
Gift Subscription
to a Friend or to your local library?

RADIOACTIVITY AMELIORATION SUMMARY

From: Clean Energy Technologies, Inc. (7/31/97)

The following data represent results from previous experiments performed on the amelioration of radioactive material (Stage I). These methods were developed by Dr. James A. Patterson. The results are from one of four variations of the amelioration process. Results displayed in Table 1, Table 2, and Table 3 represent Stage I (Carbon) of the radioactive amelioration development. The Stage II (Ceramic) radioactive amelioration process reduces over 3 times the amount of radioactive material than Stage I. Stage III and Stage IV radioactive amelioration processes have radioactive reductions on the level of 50 times the amount of U which were demonstrated in Stage I. Information regarding Stages III and IV will be available at a later date, pending third party confirmations.

Table 1. The following data represent a sample of radioactive amelioration runs performed on the uranium and thorium loaded carbon matrix within the Patterson Transmutation Cell™ configuration. Radioactive counts were taken on the samples using a Geiger-Muller counter manufactured by Technical Associates, Model PUG-7 or Model PRS-5. The initial and final counts represent the bead contents present in the cell as determined under dry conditions with the Geiger-Muller counter. This data does not include correction factors based upon difference in particle size distribution.

Trial	Initial Count (cpm)	Final Count (cpm)	Percent Loss of Radioactivity	Duration (hours)	Bead Amount (mLs)	Current (amps)	Voltage (volts)	Flow rate (mLs/min)
1	2750	800	71	17	2	0.02-0.14	4.0-10	10
2	3400	500	85	8	2	0.02-0.08	7.5-10	10
3	12000	800	93	3	2	0.2-0.5	15-22	4.0
4	3300	350	89	10	1.1	0.3-0.4	25-30	16
5	18000	5200	71	3.5	2	0.4	5	16
6	7500	2800	63	16	approx. 1 (0.28g)	0.02	6.4-18.5	22
7	3500	1200	66	3.9	approx. 0.5 (0.15g)	0.05-0.4	10.5-40.3	22.4
8	6800	4200	38	1.5	2	0.2-0.8	11.0-12.0	4

Additional third party independent studies on radioactive amelioration were performed using the U and Th loaded carbon matrix beads. The types of analyses performed were neutron activation analysis (NAA) and inductively coupled plasma-mass spectrometry (ICP-MS). Analyses performed also used the Geiger-Muller counter, germanium crystal gamma detector, and alpha and beta spectrometers.

Two separate experimental runs were performed which examined the loss of radioactivity as measured with a Geiger-Muller counter. The reductions which were observed resulted in 78% and 84% losses. The first run which exhibited a 78% decrease in radioactivity was also analyzed for ^{228}Ac and ^{234m}Pa using a Ge crystal gamma detector. This sample demonstrated a 59% decrease in ^{223}Ac and a 71% decrease in ^{234m}Pa. The same sample was also subjected to an ICP-MS analysis, as shown in Table 3. Th decreased in the system from 15700 ppm to 9080 ppm or 42%. U decreased as well, from 113000 ppm to 47700 ppm, representing a 58% loss. From the final mass of the sample and the ICP-MS values obtained, a mass determination of U can be made. Assuming a uniform distribution of U loaded in the carbon bead matrix, calculations can be made to determine the loss of U within the system. Previous to the reaction, 31.64 mg of U were present. Subsequent to the reaction, 11.93 mg of U remained in the beads and 1.93 mg of U were accounted for in the electrolyte. This resulted in a total loss of 17.78 mg of U that was calculated. As shown in Table 3, element concentrations which increased after the reaction include Al, Ba, Ca, Fe, Li, Mg, Na, Ni, Pb, S, and Zn. The same beads were also analyzed with alpha and beta spectrometers. It was determined that a decrease of 49% of gross alpha particles and a decrease of 52% of gross beta particles had occurred after the reaction.

Table 2. ICP-MS data obtained operating the Patterson Transmutation Cell™ for radioactive amelioration. All initial and final values are reported in ppm.

NAA was also performed on a separate batch of U and Th loaded beads. The results are displayed in Table 3. A reduction of 96% and 99% respectively, was seen in ^{233}Pa and ^{239}Np.

Table 3. Neutron Activation Analysis data obtained operating the Patterson Transmutation Cell™ for radioactive amelioration. All initial and final values are reported in ppm.

Table 4. Seriatim experiments performed operating Stage III of the Patterson Transmutation Cell™. The total amount of U added in this series of five experiments was 40.5 grams.

New Energy Times Archive

American Nuclear Society Meeting Features Transmutation Low-Energy Transmutation Session - June 5, 1997, Orlando, Florida—

Table 2.

Element	Initial	Final
Al	25.4	115
Ba	<2.5	259
Ca	200	905
Fe	323	385
Li	26.8	1870
Mg	50	147
Na	50	896
Ni	6.7	124
Pb	1	15.2
S	1850	3990
Th	15700	9080
U	113000	47700
Zn	9	71

Table 3.

Element	Z	Initial	Final
^{24}Na	11	74.3	120
^{27}Mg	12	146000	4000
^{56}Mn	25	500	2.9
^{233}Pa	90	49000	2000
^{239}Np	**93**	164000	2000

Dr. James Patterson and Prof. John O'M. Bockris

Prof. Lali Chartterjee and Prof. Geroge Miley

This was a very historic meeting, a special all-afternoon session on low-energy transmutation at the American Nuclear Society's (ANS) Annual Meeting. The meeting chairman was Professor George Miley of the University of Illinois (and Editor of *Fusion Technology*, the ANS publication on hot fusion—but, at his insistence, having a cold fusion section since 1989).

There was not as much time as is normally afforded by longer cold fusion meetings, but the subject was very concentrated on nuclear changes in the Patterson Power Cell, other electrochemical cells, and in discoveries of the ability of cold fusion cells to transmute radioactive elements to non-radioactive nuclides. Dr. Patterson presented these latter findings of Clean Energy Technologies, Inc. (CETI). We at *Infinite Energy* hope to have much more material on CETI's work in Issue #15 (fall, 1997). And, since we video-taped the meeting, we are planning to offer for sale a complete video tape of the session. (***Please contact us for details.)***

Professor John O'M. Bockris presented an overview of his transmutation and cold fusion work, especially appropriate since he was about to retire from the cold-nuclear wars at Texas A&M. Prof. Dash described his brilliant, but shoestring-budget work at Portland State University in Oregon. He mentioned the now famous findings that even after some of his cold fusion cathodes have been retired from their aqueous environments, element changes on the surface features continue to occur, apparently over long periods of time! Dr. Claytor came from Los Alamos National Laboratory to discuss his tritium production work in gas phase electrical discharge systems. Dr. Hora and Dr. Miley addressed theoretical issues, as did a brilliant new face to the field — astrophysicist Professor Lali Chatterjee from Cumberland University in Tennessee.

An interesting poster—provided by CETI— was the sign depicted below that was designed to draw attention to the session. Though the small technical session room drew some 50 to 60 attendees, not everyone would likely realize what "Low-Energy Nuclear Reactions—Panel," as given in the program, was all about. The pointed and controversial sign might have been responsible for alerting ANS attendees to the true nature of the subject matter! However, as a long-time cold-fusioneer, I must admit that the sign did give me some pause, for whatever we call these reactions, it is reasonably clear that some level of initially fusion-type reactions must be occurring.—*EFM*

Run	Time (min)	Delta T (C)	% Count Reduction	Net Initial U (Grams)	U Remaining (Grams)	U Reacted (Grams)
1	180	19	62	12.1	4.6	7.5
2	180	19	45	11.7	6.4	5.3
3	150	19	59	13.5	5.5	8
4	195	19	42	12.6	7.3	5.3
5	135	66	16	14.4	12.1	2.3
TOTAL	840		70		12.1	28.4

(L to R) Dr. Heinrich Hora, Dr. Tom Claytor, and Prof. John Dash

New Energy Times Archive

The Cincinnati Group Discloses Its Radioactivity Remediation Protocol...

and begins to *Sell* LENT™ (Low Energy Nuclear Transmutation) KITS

—A report written and compiled by Eugene Mallove, Sc.D.—

An Ohio group of inventors, *The Cincinnati Group*, first talked about in *Infinite Energy* Issue #5&6, is now completely confident of its simplified and *low energy* nuclear transmutation process for converting thorium to a range of lower atomic mass products. Thus, they claim to accomplish within minutes-to-hours what Nature requires tens of billions of years to do—at a cost of mere pennies of electrical energy input. (The half-life of thorium-232 is 14 billion years.) No exotic materials— except zirconium metal electrodes—are required.

Exhaustive testing over the past two years has improved the reliability of the process and led to confidence by the group that it is real, robust, and repeatable at will. The technique has been checked at independent laboratories. To get an idea of the excitement being generated by spreading news of the process, one laboratory person at the Illinois Department of Natural Resources Waste Management and Research Center in Champaign, Illinois exclaimed in his preliminary testing report: "I'm having a devil of a time believing the data— unless you are aware of some sources (other than transmutation), but the isotopic scans are showing this is real!"

More such checks are underway at government-affiliated labs in the state of Washington (Pacific Northwest National Laboratory, PNNL—operated for the DOE by Battelle). If the process should be extendible to other radioactive materials, such as plutonium, cesium, strontium, etc., as seems likely to them, the group hopes to earn significant revenues by licensing the process to large corporations that are already working on conventional nuclear waste reduction systems—typically by encapsulation and geological burial.

Because Florida-based Clean Energy Technologies, Inc. (CETI) also says it has convincing proof of its own patent-pending low-energy nuclear waste remediating process, and has presented its findings at a special session of the American Nuclear Society meeting last June (as well as on national television), gives a large measure of confidence that *The Cincinnati Group's* work is for real. The CETI process, though different, is also electrolytic. It is, in effect, an independent check on the Ohio work. Conventional physics says *neither* process should work, but they both appear to work repeatably. CETI also is having its processes checked out at the Hanford, Washington— a major site of nuclear waste disposal activities.

The Cincinnati Group has applied for U.S. and foreign patent protection, but it believes it is in the interest of all concerned—all humanity—to reveal the protocol for the process. We are proud to be able to provide it right now in this article (see adjoining material and diagrams). It is in the form of a sample run, an exploded-view diagram of the pressurized cell, and a few experimental parameters—such as the solution concentration of the thorium nitrate material used as a test medium.

This disclosure should allow many laboratories to confirm the process. Simultaneously, the group has begun to offer a Low Energy Nuclear Transmutation Kit (*LENT-1*) for sale. Deliveries are scheduled to begin this fall. The group will support kit purchasers with technical assistance to make sure success is achieved. A final assurance is the group's money-back guarantee.

This major commercial development should prompt a world-wide effort to verify *The Cincinnati Group's* claims. This modern-day incarnation of alchemy is obviously a profound and shocking claim to be making—much more dramatic in many ways than the now amply verified original Pons/Fleischmann cold fusion claims. Even if the process occurs in a simple electrolytic cell, the theoretical energy release of transmuting a significant fraction of a gram of thorium to lighter products—by conventional understanding—should be enormous. But the group has experienced no large apparent energy releases with its process. It appears to be *athermal*, though calorimetry will have to be done to determine whether there is any excess energy at all.

Moreover, the process has been checked this summer at a DOE-connected laboratory (PNNL) and found to produce *no* detectable neutron or gamma ray emissions while the closed-cell device was operating. The process, if real, is certainly *aneutronic!* The very idea that the high Coulombic barrier (electrical repulsion) could be broken done so easily and safely, with such a beneficial result, is patently *unthinkable* in the context of conventional physics. In fact, that there were no high-level neutron emissions involved in the Pons-Fleischmann process was widely used as a criticism of the Utah claims. We will now have to see whether other groups bring forth widespread validation of the process being put forth by *The Cincinnati Group*.

Several Laboratories have already participated in testing the before and after materials of the experiment and find remarkable agreement that a huge percentage (often over 90%!) of the pre-existing thorium has disappeared from the closed-cell chamber. The thorium has converted to such lower-mass nuclides as copper and titanium. No doubt lighter elements are produced too—not all accountable for by the ICP/MS (Inductively Coupled Plasma/Mass Spectrometry) measurement devices employed. And, there is much evidence provided by *Cincinnati* of non-natural isotope abundances in the products—such as the copper-65 versus copper-63 ratio being changed 2,000%, and reversed. Cell contents have been elaborately scoured and counted for radiation remaining to insure that radioactive material is not simply being "hidden" by an unknown process within chamber components. See in this report, in particular, the extensive commentary on testing procedures by Robert Liversage of Data Chem.

If the past is any guide, it helps to have *some* theoretical physics framework under which *The Cincinnati Group's* process might be understood. Physics Professor Robert T. Bush of California Polytechnic University, Pomona, has put forth a cold fusion/cold fission mechanism that may explain what is going on. In this issue, he gives a brief extract and overview of his theory.

Bush's colleague, Physics Professor Robert Eagleton at Cal Poly, Pomona, who has worked with *The Cincinnati Group*, also has envisioned another interesting theory. We hope to publish it some time in the future. Professor Eagelton's "Multi-proton Coherent Resonant Absorption" idea and Professor Bush's ideas may be right or they may be wrong, but they are at least places to start. We are sure that theoreticians in the cold fusion field will have a *field day* creating alternative theories—the more the better! Dr. Robert Bass, a cold fusion theorist himself, provides some commentary on the Eagleton theory.

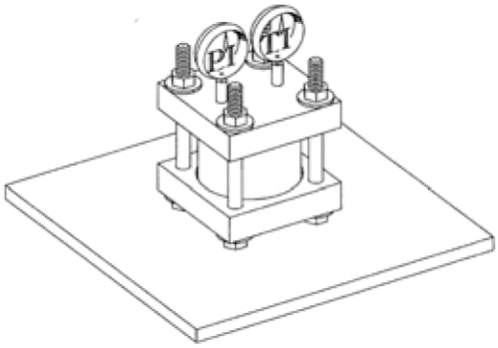
New Energy Times Archive

Protocol for Thorium Activity Remediation

Data and Diagrams Courtesy, *The Cincinnati Group*

CAUTION

This experiment should be done *only* in a safe, qualified laboratory with experienced personnel. There are electrical hazards—and temperature and **pressure hazards**, in addition to the presence of mildly radioactive materials. Cell pressures can range to 4 atmospheres and beyond. So the electrolytic cell must be constructed with appropriate safety factors. Neither The Cincinnati Group nor *Infinite Energy* are responsible for the consequences of unsafe laboratory practice. Better yet, purchase a **Guaranteed** LENT-1 kit from The Cincinnati Group (see ad, page 5).



Low Energy Nuclear Transmutation Cell

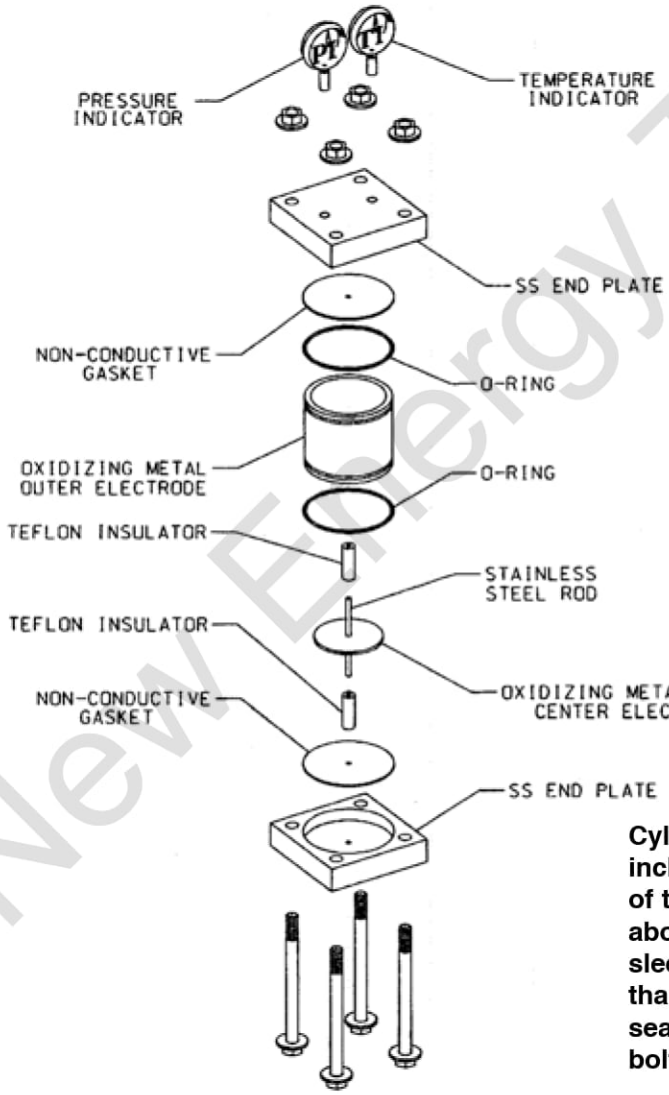
Showing Temperature and Pressure Gages

Typical Current-Voltage Profile for Remediation Experiments

Test #2, June 27, 1997

Cell contents: 25 milliliters made from a solution perpared as follows:
100 milliliters of distilled water, 1 drop of HCl, 1 gram of thorium nitrate. AC power (60 Hz) to zirconium cell pictured in adjacent exploded-view. Voltage and current relationships as follows:

Time (min)	Current (amps)	Volts (V)	Temp (°F)
0	1.94	47	71.4
1	1.31	49	75.4
3	1.16	49	86.0
4	1.20	49	90.8
5	1.27	49	93.4
6	1.36/2.65	46/60	98.0
7	4.58	55	115.0
8	8.18	44	161.0
9	8.25	44	204.2
10	7.50	46	235.8
11	5.76	53	255.2
12	3.90	59	262.6
13	2.70/2.90	59/72	258.4
14	2.30/2.20	74/85	251.0
15	1.83/1.97	86/110	245.2
16	1.55/1.55	111/120	242.8
17	1.37/144	120/136	240.0
18	1.28/1.34	136/150	237
19	1.24/1.31	150/168	237
20	1.29	168	240.2
21	1.23/1.26	168/177	243.0
22	1.24	177	246
23	1.24	177	250.2
24	1.26	177	253.6
25	1.30	176	257.9
26	1.32	176	261.6
27	1.36	176	265.6
28	1.40	175	267
29	1.44	175	274.8
30	1.49	176	277.4



Note: This cell is depicted in a vertical, exploded-view. However, it must be operated *horizontally*. Also: The pressure and temperature gauges are not used. They are only for purposes of suggesting that pressure and temperature should be monitored for scientific *and* safety reasons. The CG uses a thermocouple on the exterior of the cell and a chart of temperature/versus pressure from thermodynamic tables. In this way, the cell interior is intact. No leakage can occur into any gauges.

Cylinder diameter is 1.5 inches. Overall length of the assembled cell is about 4-inches. Teflon sleeve is slightly longer than SS rod— for tight sealing of the rod when bolts are tightened.

The zirconium pipe electrode is 1.5 inches in diameter, with an approximately 0.125-inch wall-thickness.

Attach one leg of an AC (60 Hz) power supply to "oxidizing metal" (zirconium) cell chamber (outer electrode). The other contact to the power supply goes to the other electrode inside the chamber (the "oxidizing metal washer"—zirconium)—the current path goes through the teflon-shielded stainless steel rod. **NOTE WELL:** The cell with 25 ml of solution in it must be operated *horizontally*—with the axis of the cylinder parallel to the ground— for best results.

New Energy Times Archive

NEWS RELEASE Monday, June 16, 1997
LOW-ENERGY BULK-PROCESS ALCHEMY

One-Tenth Gram of Thorium Becomes Titanium & Copper

Most Sacrosanct Principles of Physics Overturned — (Transmitted by Dr. Robert Bass)

CINCINNATI, OHIO:

In a stunning upset of the fundamental dogmas of high-energy nuclear physics, a small group of inspired inventors, acting in the tradition of the Wright Brothers of nearby Dayton, Ohio, has achieved reliable, multiply-confirmed, replicable-upon-demand, low-energy, bulk-process, high-speed, dirt-cheap, modern alchemy. For example, in less than an hour, one-tenth gram of radioactive thorium has been transmuted into nine-hundredths gram of titanium plus one-hundredth gram of copper.

After two years of partial public disclosures, these latter-day Prometheans have finally achieved multiple third-party confirmations by numerous established measurement techniques and cross-checking procedures to rule out irrefutably all possibility of contamination or other experimental error, and are now calling for the public to encourage the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Department of Energy (DOE), to pay attention to their unprecedented technological breakthrough, which seems providentially to have arrived at the height of national concern over the expensive and dangerous problem posed by disposal of massive stockpiles of radioactive wastes produced both by the Department of Defense (DOD) atomic-weapons program and by the nation's many civilian nuclear power-generating plants.

Conventional-minded physical scientists have long- proclaimed low-energy bulk-process transmutation of one chemical element into another to be a flatly impossible "ancient and medieval dream" whose absurdity has been exposed by modern discoveries concerning the structure of the atom and its nucleus. Supposedly only multi-million- dollar high-energy particle accelerators, operating at energies in excess of tens of thousands of electron volts in expensive national laboratories, can perform nuclear alchemy, and that only in invisible amounts too small for ordinary comprehension or practical utility.

In contrast, the new process announced by the Cincinnati Group (as it is known to the few thousand remaining followers of the long-smoldering cold fusion controversy) could be reproduced in any high-school laboratory. The total power required to transmute one tenth gram of thorium is less than 300 watts, and the processing time is under an hour, so less than three-tenths of a kilowatt-hour (or less than three pennies' worth of electricity) is the energy requirement. The patent-pending, proprietary reaction vessel, whose technical secrets will be made available for independent replication by others as soon as the Patent issues (or at once, to serious investigators, under a standard Non-Disclosure Agreement [NDA]) ***[EDITOR's NOTE: The Cincinnati Group later decided to disclose its protocol this summer—in this issue of Infinite Energy.—EFM]***, fits inside of a four-inch cube. Initially five identical processing cells were fabricated, after the process was discovered by trial-and-error in one corner of a welding shop. The process has never failed to transmute at least eighty percent of one-tenth gram of thorium metal in under one hour at an energy cost of less than three-tenths of a kW-hr. Other elements, such as ultra-dangerous cesium-137, and uranium, also have been processed with similar results, auguring hope that mankind's Faustian-bargain nightmare of long-lived high-level radioactive waste can at last be eliminated. Different sizes of cells have been constructed and operated successfully, indicating that the process can be scaled up from grams to tons at will.

The objective is to convert a radioactive element into non-radioactive elements, which happens in nature over millions or billions of years depending upon the particular "radionuclide" under consideration. For example, in nature, uranium and thorium decay, by emission of alpha- &-beta-particles, in a long and complicated chain of reactions which stops only when the final decay products are isotopes of lead. It takes thorium ten half-lives, or 45 billion years, for 99.9 percent of any sample to decay naturally into lead. However, the new process causes random, multiple fragmentation of the thorium nucleus into elements which are non-radioactive when first created, thereby drastically speeding up the process by eliminating the need for further radioactive decay.

In one particular run, thorium was transmuted entirely into titanium and copper, within experimental error of the measuring instruments. In this case, the transmutation result consisted of ninety-percent titanium and ten-percent copper. In other runs, the result was almost entirely copper, with a small amount of titanium and iron. In one particular test, the result was about one-tenth of a gram of flakes of copper, which could be seen with the naked eye and picked up with tweezers! A color photo of this man-made copper is available. ***[Editor's Note: See this issue of IE for black and white photo.—EFM]*** The fact that this could not have been due to contamination was subsequently ruled out by processing cell blanks along with the thorium test samples, in which the only difference in the solutions placed into the reaction vessel was the presence or absence of dissolved thorium nitrate. Moreover, the clinching evidence that the copper could not have been the result of error or hoax was that its isotopic abundance ratio was discrepant from that of natural copper by about two thousand percent!

In naturally-occurring copper, the abundance of the isotope of atomic weight 65 (meaning that there is a total of 65 protons and neutrons in its nucleus) constitutes about 45 percent of the amount of the copper isotope of atomic weight 63. But in the test-run which produced macroscopically visible copper flakes, the abundance ratio was increased by a factor of 21.7 to a staggering 973 percent! Likewise two of the four isotopes of titanium in another run were hugely discrepant as regards natural isotopic abundance ratios. To produce one-tenth of a gram of copper and titanium isotopes, so out of alignment with what occurs in nature, suggests to those familiar with the difficulty of separation of other metallic isotopes that would-be hoaxers are facing a mini-Manhattan project, which is obviously far beyond the resources of private individuals working on a modest budget. This single piece of evidence alone precludes the possibility of hoax or error. ***[Editor's note: It is possible to "doctor" a sample with commercially available isotopes, but in this Editor's opinion, there is <u>zero chance</u> that this is an instance of fraud.—EFM]***

However, the Cincinnati Group, remembering the violent skepticism which greeted the claims of Fleischmann & Pons in 1989 to have demonstrated "cold" nuclear fusion of deuterium into helium by electrolysis in a simple electrochemical cell, have subjected their process to the scrutiny of every known sophisticated measurement

New Energy Times Archive

process, at both a nationally prominent testing laboratory and two nationally reputable universities, with confirmatory results. The before-and-after testing of the process-sample has employed both quadrupole mass spectrometry (utilizing an inductively coupled plasma excitation source) and atomic-emission spectrometry (based upon scanning electron microscopy). Also used were Geiger counters (to note decrease in external counts during processing) and computer-monitored scintillation counters for more accurate quantitative measurements of initial and final radiation emission by the bare ***[Editor's Note: Dried samples, obtained from the cell solution, were used.–EFM]*** unprocessed and processed samples themselves.

The basic protocol involves dissolving one gram of thorium nitrate in 100 milliliters (ml) of double-distilled water and other reagents. Then 75 ml is retained for testing as a "before" or unprocessed sample, while 25 ml is inserted into the reaction vessel. Electric current is run through the cell for less than one hour. The contents of the cell are then collected for testing as an "after" or processed sample.

To ascertain that no radioactive elements remain in the cell, it is disassembled and each part monitored for radioactivity. Additionally, one unused cell was ground up, dissolved in acid, and the digested mixture tested [by ICP/MS & TEM-EDXA] to ensure that no contaminants sufficient to produce the observed amounts of copper, titanium, etc. were present. Furthermore, even though such amounts of contaminants were already known not to be present, and yet to double-check under the fictitious assumption that they might have been present, and that ablation, leaching and/or possible transmutation of some of the elements of the cell itself might have led to error in the results, a blank test was also prepared and subjected to the reaction process, in which the sole difference between the blank run and the actual run was the absence or presence of thorium nitrate in the solution introduced into the reaction chamber. Most of the mass-spectroscopy analyses were done on four separate but related samples: (1) a reagent blank [whose results were subtracted from the following results]; (2) a cell blank [as already described]; (3) a processed sample; and (4) an unprocessed sample [from the same initial batch]. The conclusion about what percentage of the thorium had been transmuted was based upon comparison of items (3) and (4).

One of the many runs based upon the protocol just described led to a "Third Party Verification" Certificate which reads in part: "The quantitative analysis of the data indicated that the amount of thorium which had undergone transmutation was equivalent to the amount of titanium plus copper which had been formed, within experimental error."

Traditionally, science has been based upon openness and peer-reviewed publications, with no details omitted, and widespread acceptance contingent upon independent replication and confirmation. Unfortunately, basic science as practiced today is almost entirely dependent upon public funding, such as from the National Science Foundation (NSF), NASA, or, as already mentioned, the DOD and DOE. But in the case of cold fusion (CF), which is a special case of the present subject of Low Energy Nuclear Reactions (LENR), the Energy Research Advisory Board (ERAB) Report submitted to the DOE and essentially claiming that CF/LENR and the like are "physically IMPOSSIBLE" has precluded normally funded research in this emergent field. Therefore it has been all bootlegged or privately funded by small entities.

The Cincinnati Group, operating upon a shoestring, and obtaining results which the august National Academy of Science (NAS), in an elaborately expensive study and report to the DOE on the subject of cost-effective radioactive waste elimination by transmutation, has branded as essentially "inherently physically impossible," has no choice but to seek Patent Protection for its intellectual property in order to attract the necessary venture capital by means of which this almost-miraculous process can be scaled up from grams to pounds and, eventually, to tons.

Concerned citizens, who would like to see "a twenty- first century science solution" to the agonizing national problem of Radwaste Remediation (RR), should urge their Senators to encourage the Assistant Commissioner for Patents of the USPTO to strongly encourage Art Group 220 to expedite the issuance of CF/LENR patents. Only when the dead hand of the Establishment is taken off the necks of America's real creators, the small, independent inventors, and the Patent System functions in the manner which the founding fathers of this country intended when they authorized it in the Constitution, can the average citizen-taxpayer benefit from such breakthroughs as that now announced by the Cincinnati Group.

In conclusion, the Cincinnati Group wishes to express its appreciation to those who have helped it the most, starting with those elements of the national press who do not cater to "pack mentality." They would not have started their project if it had not been for the courageous decision of the Editors and Publishers of *Popular Science* magazine, breaking with their colleagues at *Nature*, *Science,* and *Scientific American*, to feature as a cover story [August 1993] "Cold Fusion: It Ain't Over Til It's Over!," a hard-hitting unbiased account of the CF scandal by *Wall Street Journal* reporter Jerry Bishop. From this article, the Cincinnati Group learned to contact Dr. Hal Fox, founder of the Fusion Information Center [P.O. Box 58639, Salt Lake City, UT 84158-0638], who advised them that the nation perhaps needed RR more desperately than cheap, clean energy at the present time. Fox, who publishes the archival, internationally Abstracted, peer-reviewed *Journal of New Energy*, also publishes a *CF Source Book*, which he has dedicated to "The Children of Chernobyl." The Cincinnati Group further publicly acknowledges great help from Dr. Eugene Mallove, publisher and editor of *Infinite Energy* magazine [available for an annual subscription of $29.50 from P.O. Box 2816, Concord, NH 03302-2816], whose next issue will contain much more detail pertaining to the presently announced seemingly-miraculous achievement. Persons with a scientific interest who would like to peruse unedited copies of the Test Reports summarized above (or contemplate signing an NDA in order to receive full disclosure) may contact Celine at P.O. Box 1262, Covington, KY 4172-1262 or, M-F, at (513) 244-1144. After June 19, the merely curious may consult the Cincinnati Group's forthcoming web page.

-END-

Transmitted by: Dr. Robert W. Bass, Registered Patent Agent 29,130 [ex-Prof. Physics] Inventor: Topolotron, Plasmasphere, issued; QRT Cold Fusion, pending P.O.Box 1238, Pahrump, NV 89041-1238; phone/FAX (702) 751-0932/0739 Voice-Mail: (702) 387-7213

e-Mail: rbrtbass@pahrump.com

Dr. Robert W. Bass at ICCF5, Monte Carlo, 1995
(Photo: Eugene Mallove)

New Energy Times Archive

Third-Party Verification of Cincinnati Group's Thorium Transmutation Process

Letter by Robert Liversage Describing Methodology

06/05/97

To Whom it May Concern:

My name is Robert Liversage. I have been asked by Mr. Stan Gleeson of The Cincinnati Group to perform a third party verification of a technology his organization has developed for the purpose of transmutation of radioactive elements into nonradioactive elements.

I was granted a Bachelor of Science in Honours Chemistry by the University of Waterloo, Waterloo, Ontario, Canada in 1981. I was granted a Master of Science in Chemistry by the University of Toronto, Toronto, Ontario, Canada in 1984. I have thirteen years experience in the field of analytical Chemistry, specializing in atomic spectroscopy. My experience, which is most pertinent to this validation process, is five years performing methods development and sample analyses on the Perkin Elmer/Sciex Elan 250 Inductively Coupled Plasma/Mass Spectrometer (ICP/MS) system I was employed by Sciex, the company which manufactures the instrument, as their Applications Specialist for two and a half of the five years.

ICP/MS was the primary analytical technique used to perform the evaluation. The other technique employed was scintillation counting. A brief description of the types of information each technique provides will be discussed below. The value of using more than one analytical technique is that the results obtained from each should complement and substantiate the other. If transmutation is occurring, we can predict the types of *analytical evidence* we should obtain from each of the techniques used. If either technique produced data which is inconsistent with our expectations, it would raise doubts as to the validity of the transmutation process, and further investigation would be required. Conversely, if both techniques yield the predicted results, the combined data provides substantial proof that transmutation is occurring.

The Perkin Elmer/Sciex Elan 250 was the ICP/MS system used to perform this evaluation. The program used to generate the data is called *total quant*. The total quant program performs a quantitative elemental and isotopic analysis of approximately ninety-five percent of the elements on the periodic table In addition, if any non-naturally occurring radioactive isotopes were synthesized by the transmutation process, they may also be detected. The Cincinnati Group chose to use a solution containing approximately 0.3 percent thorium nitrate plus a few drops of hydrochloric acid in double distilled water as their test sample. The solution was split. One portion was set aside, and the other portion was subjected to the reaction process. In order to discriminate between the elements present in the processed sample which are due to transmutation of thorium from those which may be due to ablation, and leaching and/or possible transmutation of thorium materials used to construct the reaction vessel, a blank was also prepared and subjected to the reaction process. The **preparation-blank** contained a few drops of hydrochloric acid in double distilled water. The preparation blank was subjected to the same reaction parameters as the test solution. Consequently, the only difference between the preparation blank run and the test sample run was the presence of thorium nitrate in the test sample. If significant transmutation of thorium is occurring in The Cincinnati Group's reaction vessel, comparison of the *total quant* results obtained for the before-processed and after-processed test solutions should show a substantial reduction in thorium concentration. Comparison of the preparation blank data and the after-processed test solution should show a significant increase in concentration of one or more elements in the after-processed solution. Elements which are not detected in the preparation blank at all may be observed in the after processed test solution Finally, if quantitative-transmutation of thorium is occurring, the analytical evidence may also include significant deviations from the natural isotopic abundance ratios for the elements which are present in the after-processed sample due to transmutation The isotopic-ratios of elements in naturally occurring substances is considered to be a constant, and well defined. If fission of thorium is occurring, we might expect random fragmentation into lighter isotopes. Random fragmentation may yield altered isotopic abundance ratios. Altered isotopic abundance ratios would be an additional significant indication that transmutation has occurred.

> ***The quantitative analysis of the data indicated that the amount of thorium which had undergone transmutation was equivalent to the amount of titanium plus copper which had been formed, within experimental error.***

Comparison of the processed test solution with the unprocessed test solution data showed that 80% of the thorium placed in the reaction cell had undergone transmutation. Comparison of the cell-blank data with the processed test sample data indicated that significant quantities of titanium and copper had been produced. The concentration of titanium in the processed sample was 10 times greater than the copper concentration. In addition, significantly altered isotopic ratios were observed for both elements. Copper has two isotopes at mass 63 and mass 65. The natural abundance ratio of mass 65 to 63 is 0.45. The ratio observed in the processed sample was 8.2. This represents an 1800 percent deviation from the natural abundance ratio. Titanium has five isotopes. The isotope at mass 48 is, naturally, the most abundant. Three of the four minor isotopes produced an isotopic ratio, with respect to the mass 48 isotope, which was equivalent to the natural abundance ratio. However, the mass 49 isotope produced a mass 49 to 48 ratio of 0.42. The natural abundance ratio is 0.075. This represents a deviation from the natural abundance ratio of 560 percent.

To further-substantiate the validity of the ICP/MS data, a comparison of the quantity of thorium which had been transmuted to the quantity of titanium and copper which had been produced, was performed. The quantitative analysis of the data indicated that the amount of thorium which had undergone transmutation was equivalent to the amount of titanium plus copper which had been formed, within experimental error.

Scintillation counting was performed on the before-processed and after-processed test solutions to verify the ICP/MS results, which indicated that a significant percentage of the thorium placed in the reaction vessel had been transmuted into nonradioactive isotopes. All of the copper and titanium isotopes observed in the after-processed test-solution ICP/MS data are non-radioactive. The scintillation counter used for the analysis was a RM-60 Micro Roentgen Radiation Monitor [from Aware Electronics, New Jersey]. The counter was connected to a Compudyne computer. Equivalent amounts of before-processed

New Energy Times Archive

and after-processed test solution were taken to dryness in plastic weighing boats. The scintillation counter was placed-at exactly the same height, directly over the weighing boats, for both tests The residues were then counted for 90 minutes. A relatively long counting time was used to ensure accurate results. The results obtained indicated that a 72 percent reduction of thorium had occurred

After extraction of the processed sample, the reaction vessel was taken apart and all of the pieces of the vessel were individually analyzed by a scintillation counter to ensure that a complete extraction of the thorium had occurred. All of the parts of the vessel produced count rates equivalent to normal background count rates, which indicated that the thorium was completely extracted

My conclusion is that the data generated by both of the analytical techniques used to evaluate The Cincinnati Group's process indicate that significant transmutation of thorium is occurring in their reaction vessel. All of-the data generated from both of the analytical techniques employed produced the anticipated results.

Robert R. Liversage, M.S.

Robert R. Liversage, M.S.
Inorganic Section Manager
Data Chem Laboratories

6/20/97

To Whom it May Concern:

These *[Ed Note: sample vials sent to Cold Fusion Technology, Inc. and to others.]* are the four samples used to generate the third-party verification letter for the Cincinnati Group.

—There are exactly 20.0 ml of solution in each vial for convenient spiking of internal standards, for ICP/MS analysis, to compensate for matrix effects. Suggested internal standard elements: Be for low mass, Ge, Ga, or Sc for middle mass elements, and U for high mass. Beryllium, germanium, and uranium, at around 2 mg/liter in solution, was used for the third-party verification analyses.

—**Vial 1 = REAGENT BLANK** - 5% concentrated nitric acid (Mallinckrodt reagent grade), plus 5% concentrated hydrochloric acid (Mallinckrodt reagent grade) in 18 meg-Ohm de-ionized water. This solution was used for blank subtraction of the mass spectra generated by the sample solutions in vials 2, 3, and 4 described below. This solution was also used to perform the dilutions on the samples contained in vials 2,3, and 4, as described below.

Cell blank stock solution: Two drops of concentrated hydrochloric acid into 600 ml of double distilled water.

Thorium stock solution: two drops of concentrated hydrochloric acid plus approximately (6) grams of thorium nitrate crystals into 600 ml of double-distilled water.

—**VIAL 2 = Cell Blank** - The solution in vial 2 is a 100X dilution of the original processed cell blank solution. Twenty milliliters of cell blank stock solution was placed in the same cell and subjected to the same processing parameters as the processed thorium test sample described below.

—**VIAL 3 = Processed Thorium Test Sample** - The solution in Vial 3 is a 100X dilution of the original processed thorium test sample solution. Twenty milliliters of thorium stock solution were placed in the cell and processed.

—**VIAL 4 = Unprocessed Thorium Test Sample** - the solution in Vial 4 is a 100X dilution of the thorium stock solution.

COMMENTS

1.) After processing the cell blank and thorium test sample, the cell contents were extracted with a 5% nitric acid/5% hydrochloric acid leaching solution. This is the same solution used as the reagent blank, and to dilute the samples contained in vials 2,3, and 4.

2.) The processed cell blank and thorium test sample solutions were taken to an intermediate 10X dilution after extraction from the cell. The final acid concentrations in these intermediate dilutions were 20% nitric acid and 20% hydrochloric acid. These intermediate solutions were not subjected to either a hot plate or microwave digestion. The solutions were diluted to the final 100X working concentration several days after the cells were extracted. Please perform a hot plate or microwave digestion at your discretion. The intermediate solutions were shaken vigorously before extracting the aliquots used to make up working solutions to ensure that representative samples were prepared.

3.) The cell was disassembled after processing and extracting the cell blank and the thorium test sample to ensure quantitative extraction of the contents. After extracting the thorium test sample, all of the parts were measured with a scintillation counter to ensure quantitative extraction of the untransmuted thorium. The count rates generated by all of the parts were at the normal background levels.

4.) All four solutions were analyzed at the 100X dilution by ICP/MS for the third party verification.

5.) We found that thorium "hangs-up" in the ICP/MS sample introduction hardware tenaciously. Consequently, we recommend the samples be analyzed in order, vials 1 through 4, to minimize errors in thorium quantitation due to memory effects.

6.) To determine the amount of thorium transmuted: (Blank subtracted Vial 4 results) minus (Blank subtracted Vial 3 results).

To determine what, and the amounts of transmutation products: (Blank subtracted Vial 3 results) minus (Blank subtracted Vial 2 results)

If you have any additional questions please contact Robert Liversage.

6/24/97

To Whom It May Concern:

These are the four ICP/MS scans used to generate the third-party verification letter for the Cincinnati Group.

SCAN 1 = Reagent Blank - 5% concentrated nitric acid (Mallinckrodt reagent grade), plus 5% concentrated hydrochloric acid (Mallinckrodt reagent grade) in 18 meg-Ohm de-ionized water. This scan was used to blank subtract the mass spectra generated by the sample solutions described below. This solution was used to perform the dilutions on the samples as described below.

Cell blank stock solution: Two drops of concentrated hydrochloric acid into 600 ml of double distilled water.

Thorium stock solution: two drops of concentrated hydrochloric acid plus approximately (6) grams of thorium nitrate crystals into 600 ml of double-distilled water.

—**SCAN 2 = Cell Blank** - Scan 2 was generated from a 100X dilution of the original processed cell blank solution. Twenty milliliters of cell blank stock solution was placed in the same cell and subjected to the same processing parameters as the processed thorium test sample described below.

New Energy Times Archive

—SCAN 3 = Processed Thorium Test Sample - Scan 3 was generated from a 100X dilution of the original processed thorium test sample solution. Twenty milliliters of thorium stock solution were placed in the cell and processed.

—SCAN 4 = Unprocessed Thorium Test Sample - Scan 4 was generated from a 100X dilution of the thorium stock solution.

COMMENTS

1.) After processing the cell blank and thorium test sample, the cell contents were extracted with a 5% nitric acid/5% hydrochloric acid leaching solution. This is the same solution used as the reagent blank, and to dilute the samples in order to generate Scans 2,3, and 4.

2.) The processed cell blank and thorium test sample solutions were taken to an intermediate 10X dilution after extraction from the cell. The final acid concentrations in these intermediate dilutions were 20% nitric acid and 20% hydrochloric acid. These intermediate solutions were not subjected to either a hot plate or microwave digestion. The solutions were diluted to the final 100X working concentration several days after the cells were extracted. Please perform a hot plate or microwave digestion at your discretion. The intermediate solutions were shaken vigorously before extracting the aliquots used to make up working solutions to ensure that representative samples were prepared.

3.) The cell was disassembled after processing and extracting the cell blank and the thorium test sample to ensure quantitative extraction of the contents. After extracting the thorium test sample, all of the parts were measured with a scintillation counter to ensure quantitative extraction of the untransmuted thorium. The count rates generated by all of the parts were at the normal background levels.

4.) All three sample solutions were analyzed at the 100X dilution by ICP/MS for the third party verification.

5.) To verify thorium reduction:
Compare (Blank subtracted Vial 4 results) against (Blank subtracted Vial 3 results).
To determine what the transmutation products are:
Compare (Blank subtracted Vial 3 results) against (Blank subtracted Vial 2 results)

6. Accurate determination of the amount of thorium transmuted and the amounts of product elements formed is not possible with the information provided. Additional information is required. If you are interested in obtaining a copy of this quantitative analysis of the data, please submit your request to:

Robert Liversage
P.O. Box 1262
Covington, KY 41012-1262

7.) Note: Beryllium, germanium, and uranium were spiked into all four solutions as internal standards for matrix effect compensation. All four solutions were scanned unspiked first to verify that these three metals were not present in the samples.

A *SECOND* Third-Party Verification

Infinite Energy has received from *The Cincinnati Group* news of an additional confirmation. A second third-party verification has been performed by Dr. George Miley of the Unviersity of Illinois, Professor of Nuclear Engineering and head of the Fusion Research Laboratory there.

Dr. Miley witnessed the operation of the reaction cell at his laboratory. The process was performed on an aqueous thorium nitrate solution. The concentration of the test solution and the cell operating parameters were similar to those used to generate the first third-party verification performed by Robert Liversage.

Dr. Miley's laboratory's personnel extracted the sample from the cell for ICP/MS and gamma spectroscopy analysis on equal amounts of processed and unprocessed test solution. The gamma spectroscopy analysis on equal amounts of processed and unprocessed test solution showed a nearly 100% reduction of the thorium. The cell was subsequently broken down into its components for scintillation counting. All parts of the reaction vessel produced count rates equivalent to natural background rates, indicating that thorium had not plated-out on any part of the cell.

Dr. Miley sent the samples to the Waste management and Research Center for ICP/MS analysis. The Analysis was performed by Jonathan Talbot on a Perkin-Elmer/Sciex ICP/MS. The quantitative analysis of thorium performed on the processed and unprocessed throium test solution showed a greater than 97% reduction of thorium in the processed sample—a "total quant" scan was performed on on the processed sample to determine the major transmutation products. A preparation cell (cell blank) was not prepared, consequently, a valid blank subtraction, to discriminate between contaminants (see the *first* third-party verification work for more details) and actual transmutation products could not be performed. However, the significant ion count rates observed at masses 46 through 50 indicate that titanium is a major transmutation product. This observation is consistent with Robert Liversage's third party verification findings. In his evaluation, Mr. Liversage determined titanium and copper to be the major transmutation products.

Key to Understanding ICP/MS Scans on Following Pages

Basic Definition of Column Units:

Mass = Mass/charge ration (M/e): where e = 1 for >99% of the ions emitted from the ICP excitation source under normal operating conditions. Quantitative and qualitative analysis is performed on the singly-charged ions of all elements.
Total Intensity: Units = counts per second (CPS). CPS is proportional to the number of ions impacting the detector per second (IPS). CPS $\propto$ IPS.
Assigned Intensity: Units = CPS (counts per second)

Meaning of Each Column:

Total Intensity = The total CPS that the "Total Quant" software assigns to each naturally occurring singly-charged isotope of each element of each mass. Some more common molecular species are assigned intensities also. The Total Quant program first determines what elements are present in the sample by comparing the total intensities at each mass with a built-in library containing all of the naturally occurring isotopes and their relative abundances. The Total Quant program expects to see signals above background at each mass for which the element to be determined has naturally occurring isotopes, and at relative intensities which are consistent with the relative abundance ratios. This type of qualitative analysis is analogous to gas chromatography/mass spectrometry finger-printing. Once an element is positively identified, the Total Quant software determines how much intensity to assign to each isotope by first "keying in" on the total intensity at the most abundant isotope of each element which is not coincident with (i.e. having the same mass as) isotopes of other elements. (Every element on the periodic table, with the exception of indium[1], has at least one un-interfered-with isotope. The software then determines how much actual intensity to assign to all of the other isotopes of the positively identified elements by multiplying the intensity of the uninterfered with isotope by the natural abundance ratio (i.e. isotope to be determined/uninterfered with isotope).

Ideally, the sum of the assigned intensities at each mass should equal the total intensities, within experimental error. Any left over intensity which could not be assigned to an isotope of an element which occurs at that mass appears after the assigned intensities, at each mass, and is preceded by two question marks. With respect to the transmutation process, it is reasonable to assume that significant unassigned intensities are a result of altered isotopic abundance ratios, as described in Robert Liversage's Third Party Verification letter.

Positive identification of transmutation products was performed by comparing the total intensities at each mass on the cell blank and processed tho-

New Energy Times Archive

Scan #1 Reagent Blank

TOTALQUANT II: COMPREHENSIVE REPORT

Data Set:	jec_std
Data Set Description:	
Parameter File:	tq-fscan
Sample ID:	sample 18
Sample Description:	
Sample Type:	Blank
Sequence Number:	088
Blank:	Not Subtracted
Dilution Factor:	1
Number of Repeats:	1
Time:	10:46:54 May 2 1997
Signal Profile Processing:	Average
Spectral Peak Processing:	Average
Units:	mg/L
Response File:	current.rsp

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
4	0			
5	0			
6	0			
7	0			
8	412	?? 412		
9	108140	Be 108140		
10	188	B 177	?? 11	
11	716	B 716		
12	4476	C 4476		
13	96	C 51	CH 9	?? 36
21	204	Ne 1	?? 203	
22	20	Ne 20		
23	19328	Na 19328		
24	1792	Mg 1793	?? -1	
25	356	Mg 231	?? 125	
26	516	Mg 255	CN 3	?? 258
27	3496	Al 3496	CN 1	?? -1
28	22544	Si 22544		
29	11584	Si 1150	COH 447	NNH 9989
		?? -2		
30	3363192	Si 756	COH 6	NO 745425
		NNH 75	?? 2616930	
31	15016	P 15016	COH 1	NO 2769
		?? -2770		
32	2961796	S 2961796	NO 1524	?? -1524
33	8668	S 23695	?? -15027	
34	10568	S 131567	?? -120999	
35	1694916	Cl 1406914	?? 288002	
36	86932	S 1248	Ar 86832	?? -1148
37	455808	Cl 455808		
38	34012	Ar 16233	?? 17779	
42	45984	Ca 148	?? 45836	
43	52	Ca 34	?? 18	
44	476	Ca 476		
45	252	Sc 252		
46	1972	Ca 1	Ti 125	NOO 1847
		?? -1		
47	1128	Ti 115	NOO 7	?? 1006
48	1200	Ca 42	Ti 1159	NOO 8
		?? -9		
49	1036	Ti 87	?? 949	
50	412	Ti 84	V 46	Cr 707
		NAr 19	?? -444	
51	18804	V 18804		
52	13736	Cr 13736		
53	6552	Cr 1567	ArOH 18	?? 4967
54	6340	Cr 391	Fe 364	NAr 5586
		?? -1		
55	616	Mn 596	NAr 21	?? -1
56	5732	Fe 5732		
57	5188	Fe 137	ArOH 5052	?? -1
58	300	Fe 21	Ni 166	?? 113
59	192	Co 182	ArOH 11	?? -1
60	64	Ni 64		
61	40	Ni 3	ScO 2	?? 35
62	28	Ni 9	?? 19	
63	88	Cu 88	ScO 1	?? -1
64	3748	Ni 3	Zn 3746	?? -1
65	3756	Cu 40	?? 3716	
66	2640	Zn 2131	?? 509	
67	1880	Zn 315	?? 1565	
68	1924	Zn 1423	?? 501	
69	568	Ga 568		
70	46760	Zn 48	Ge 46713	?? -1
71	6560	Ga 373	ClAr 1	?? 6186
72	81452	Ge 62443	?? 19009	
73	31244	Ge 17666	?? 13578	
74	126440	Ge 83182	Se 43	?? 43215
75	3748	As 3748	ClAr 1	?? -1
76	33332	Ge 17666	Se 438	ArAr 33
		?? 15195		
??	368	Se 368	ClAr 1	ArArH 2
		?? -3		
78	20	Se 1142	?? -1122	
79	468	Br 468		
80	7164	Se 2419	ArAr 4746	?? -1
81	676	Br 458	ArArH 219	?? -1

Mass	Total Intensity	Assigned Intensities		
82	0	Se 447	?? -447	
83	4	?? 4		
84	8	Sr 3	?? 5	
85	0			
86	152	Sr 42	?? 110	
87	140	Sr 30	?? 110	
88	344	Sr 344		
89	200	Y 200		
90	540	Zr 540		
91	228	Zr 118	?? 110	
92	592	Zr 180	Mo 338	?? 74
93	100	Nb 100		
94	372	Zr 183	Mo 211	?? -22
95	384	Mo 362	?? 22	
96	384	Zr 30	Mo 379	?? -25
97	272	Mo 217	?? 55	
98	548	Mo 548		
99	8	?? 8		
100	256	Mo 219	?? 37	
101	0			
102	8	Pd 1	?? 7	
103	12	Rh 12		
104	4	Pd 4		
105	24	Pd 9	YO 3	?? 12
106	176	Pd 10	?? 166	
107	56	Ag 56	YO 1	?? -1
108	132	Pd 10	?? 122	
109	108	Ag 53	NbO 3	?? 52
110	120	Pd 5	?? 115	
111	40	NbO 1	?? 39	
112	68	Sn 23	?? 45	
113	4	In 28	?? -24	
114	24	Sn 16	?? 8	
115	632	In 625	Sn 9	?? -2
116	332	Sn 340	?? -8	
117	156	Sn 181	?? -25	
118	572	Sn 571	?? 1	
119	436	Sn 204	?? 232	
120	780	Sn 781	?? -1	
121	44	Sb 44		
122	252	Sn 113	?? 139	
123	40	Sb 33	?? 7	
124	120	Sn 142	Xe 1	?? -23
125	0			
126	28	Xe 1	?? 27	
127	456	I 456		
128	0	Xe 2	?? -2	
129	12	Xe 22	?? -10	
130	16	Xe 4	Ba 7	?? 5
131	24	Xe 18	?? 6	
132	28	Xe 22	Ba 7	?? -1
133	0			
134	156	Xe 9	Ba 152	?? -5
135	420	Ba 414	?? 6	
136	596	Xe 8	Ba 491	?? 97
137	956	Ba 711	?? 245	
138	4496	Ba 4496	La 1	?? -1
139	8	La 8		
140	28	?? 28		
141	4	Pr 4		
142	0			
143	0			
144	0			
145	0			
146	4	BaO 1	?? 3	
147	0	BaOH 1	?? -1	
148	4	?? 4		
149	12	?? 12		
150	0	BaO 1	?? -1	
151	4	Eu 5	BaO 1	BaOH 2
		?? -4		
152	12	BaO 1	BaOH 5	?? 6
153	20	Eu 5	BaO 1	BaOH 5
		?? 8		
154	32	BaO 9	BaOH 7	?? 16
155	44	BaOH 44	LaO 1	?? -1
156	184	BaO 1	?? 183	
157	4	BaOH 1	LaO 1	PrO 1
		?? 1		
158	28	?? 28		
159	0	PrO 1	?? -1	
160	0			
161	0			
162	4	?? 4		
163	0			
164	4	?? 4		
165	0			
166	4	?? 4		
167	4	?? 4		
168	0			
169	0			
170	0			
171	0			
172	0			
173	4	?? 4		
174	0			
175	0			
176	0			

TOTALQUANT II: COMPREHENSIVE REPORT

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
177	0			
178	16	?? 16		
179	4	?? 4		
180	4	Ta 1	W 3	
181	100	Ta 100		
182	396	W 387	?? 9	
183	160	W 211	?? -51	
184	448	W 448		
185	0			
186	436	W 419	?? 17	
187	0			
188	0			
189	0			
190	4	?? 4		
191	0			
192	4	?? 4		
193	0			
194	0			
195	0			
196	0	WO 1	?? -1	
197	12	Au 9	TaO 4	?? -1
198	44	WO 2	?? 42	
199	8	TaO 1	WO 1	?? 6
200	60	WO 2	?? 58	
201	0			
202	60	WO 2	?? 58	
203	0			
204	12	Pb 12		
205	20	?? 20		
206	200	Pb 180	?? 20	
207	172	Pb 172		
208	528	Pb 399	?? 129	
209	0			
210	0			
211	0			
212	0			
213	0			
214	0			
215	0			
216	0			
217	4	?? 4		
218	0			
219	0			
220	0			
221	0			
222	0			
223	0			
224	0			
225	0			
226	0			
227	0			
228	0			
229	0			
230	0			
231	0			
232	1896	Th 1896		
233	0			
234	36	U 36		
235	7112	U 4545	?? 2567	
236	0			
237	100	?? 100		
238	1365680	U 627007	?? 738673	
239	28	?? 28		
240	0			
241	0			
242	0			
243	0			
244	4	?? 4		
245	0			

rium test sample mass spectra. The only difference between the cell blank and the processed thorium test samples is the presence of thorium in the test sample. Consequently, intensity contributions at each mass due to contaminants and molecular-doubly-charged interferences should be equivalent, within experimental error, in the two spectra—as explain in Robert Liversage's third party verification. ***Therefore, at masses where significantly greater total intensities were observed in the test sample, relative to the cell blank, the differences were attributed to transmutation products.*** Notice the huge (> a factor of 100 for each four out of five isotopes) difference in the processed test sample intensities versus the cell blank intensities at the titanium isotopes (masses 46 through 50). A significant difference in intensity is also observed at mass 65 (the less naturally abundant isotope of copper).

The second phase of Total Quant processing, in which isotopes are aggregated and optimally fit to a total element distribution (1 through 92), is less useful and reliable for the purposes at hand. The "intensity" column is the summation of the CPS intensities of the constituent isotopes for that element. The "Response" factor is the tabulated factor that the program uses to convert from intensities (CPS) to concentration (in parts per million, ppm) present in the input liquid solution. This response factor has units of CPS/ppm. Finally, the "Concentration" column gives the determined concentration in ppm for the element. —**RL**

1Note on indium: Indium has two isotopes. One is coincident with a minor cadmium isotope. The other is coincident with a minor tin isotope. Qualitative and quantitative analysis of indium probably first involves determining presence or absence of tin and cadmium in the sample. Any unassigned intensities at the masses where the two indium isotopes occur would then be attributed to indium.

Thorium Radioactivity Remediation Data — Third Party Verification

New Energy Times Archive

Scan #2 Cell Blank

TOTALQUANT II: COMPREHENSIVE REPORT

ANALYTE INTENSITIES

Analyte	Intensity	Response	Concentration
H	NOT MEASURED		
He	0	0.00	
Li	0	1313000.00	0.00000
Be	108140	462300.00	0.23380
B	893	844200.00	0.00106
C	4526	302500.00	0.01495
N	NOT MEASURED		
O	NOT MEASURED		
F	NOT MEASURED		
Ne	227	0.00	
Na	19328	2450000.00	0.00789
Mg	2277	727900.00	0.00313
Al	3496	1370000.00	0.00255
Si	24449	1988000.00	0.01229
P	15015	205700.00	0.07296
S	3117680	65460.00	47.62000
Cl	1862722	3032.00	614.20000
Ar	25766121	0.00	
K	NOT MEASURED		
Ca	23107	2181000.00	0.01059
Sc	252	1825000.00	0.00014
Ti	1567	1411000.00	0.00111
V	18849	1288000.00	0.01462
Cr	16399	1227000.00	0.01336
Mn	595	1469000.00	0.00041
Fe	6254	1217000.00	0.00514
Co	182	941300.00	0.00019
Ni	244	548800.00	0.00044
Cu	127	432700.00	0.00029
Zn	7661	347200.00	0.02205
Ga	940	1036000.00	0.00091
Ge	227644	1074000.00	0.21170
As	3748	209900.00	0.01785
Se	4855	283900.00	0.01710
Br	926	63280.00	0.01463
Kr	0	0.00	
Rb	0	4147000.00	0.00000
Sr	417	4500000.00	0.00009
Y	200	5358000.00	0.00004
Zr	1049	5606000.00	0.00019
Nb	100	4927000.00	0.00002
Mo	2271	4285000.00	0.00053
Ru	0	3823000.00	0.00000
Rh	12	2972000.00	0.00000
Pd	36	2931000.00	0.00001
Ag	108	2604000.00	0.00004
Cd	0	1001000.00	0.00000
In	653	2537000.00	0.00026
Sn	2374	3109000.00	0.00076
Sb	77	2063000.00	0.00004
Te	0	859200.00	0.00000
I	456	5585000.00	0.00008
Xe	81	0.00	
Cs	0	6407000.00	0.00000
Ba	6274	6368000.00	0.00099
La	8	8567000.00	0.00000
Ce	0	9979000.00	0.00000
Pr	4	9765000.00	0.00000
Nd	0	12130000.00	0.00000
Sm	0	15540000.00	0.00000
Eu	8	15610000.00	0.00000
Gd	0	18250000.00	0.00000
Tb	0	20530000.00	0.00000
Dy	0	18210000.00	0.00000
Ho	0	19470000.00	0.00000
Er	0	17850000.00	0.00000
Tm	0	16690000.00	0.00000
Yb	0	14390000.00	0.00000
Lu	0	15240000.00	0.00000
Hf	0	13800000.00	0.00000
Ta	100	11110000.00	0.00001
W	1462	10460000.00	0.00014
Re	0	9796000.00	0.00000
Os	0	12340000.00	0.00000
Ir	0	5489000.00	0.00000
Pt	0	3593000.00	0.00000
Au	8	1436000.00	0.00001
Hg	0	1023000.00	0.00000
Tl	0	2567000.00	0.00000
Pb	761	1304000.00	0.00058
Bi	0	1022000.00	0.00000
Th	1896	753400.00	0.00252
U	631579	805900.00	0.78360

CH	9
COH	453
CN	2
NH	NOT MEASURED
NO	750000
NAr	5629
NNH	10064
NOO	1863
ArOH	5084
ArAr	4784
ArArH	220
ScO	1
YO	3
NbO	3

TOTALQUANT II: COMPREHENSIVE REPORT

Data Set:	jec_std
Data Set Description:	
Parameter File:	tq-fscan
Sample ID:	sample 8
Sample Description:	
Sample Type:	Sample
Sequence Number:	089
Blank:	Subtracted (088)
Dilution Factor:	1
Number of Repeats:	1
Time:	10:49:18 May 2 1997
Signal Profile Processing:	Average
Spectral Peak Processing:	Average
Units:	ppb
Calibration File:	050297
Response File:	current.rsp

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
4	0			
5	0			
6	0	Li 5	?? -5	
7	60	Li 60		
8	80	?? 80		
9	9164	Be 9164		
10	0			
11	0			
12	0			
13	56	?? 56		
21	164	?? 164		
22	0			
23	15792	Na 15792		
24	13716	Mg 12742	?? 974	
25	1640	Mg 1640		
26	1852	Mg 1809	?? 43	
27	4348	Al 4348		
28	158228	Si 158228		
29	10644	Si 8065	NNH 2580	?? -1
30	506968	Si 5303	NO 501647	NNH 20
		?? -2		
31	3612	P 21	NO 1863	NOH 3592
		?? -1864		
32	501956	S 501956	NO 1026	NOH 14
		?? -1040		
33	2432	S 4016	NOH 8	?? -1592
34	1604	S 22298	?? -20694	
35	192396	Cl 192396		
36	27592	S 212	Ar 27577	?? -197
37	158148	Cl 62332	ArH 33083	?? 62733
38	12988	Ar 5156	?? 7832	
42	29888	Ca 813	?? 29075	
43	184	Ca 184		
44	3864	Ca 2615	?? 1249	
45	2236	Sc 2236		
46	872	Ca 5	Ti 124	NOO 745
		?? -2		
47	232	Ti 114	NOO 3	?? 115
48	1380	Ca 229	Ti 1152	NOO 4
		?? -5		
49	912	Ti 86	?? 826	
50	47348	Ti 84	V 83	Cr 65101
		?? -17920		
51	34292	V 34292	ClO 1	?? -1
52	1265148	Cr 1265148	ArO 1	?? -1
53	829924	Cr 144248	ClO 1	ArOH 83
		?? 685592		
54	494812	Cr 35949	Fe 468667	?? -9804
55	584064	Mn 586064		
56	OVERRANGE	Fe 7381091	ArO 1	
57	OVERRANGE	Fe 176354	ArOH 24390	
58	430624	Fe 26574	Ni 365731	ArO 1
		?? 38318		
59	345196	Co 345147	ArOH 50	?? -1
60	141408	Ni 141408		
61	150320	Ni 6416	ScO 12	?? 143892
62	24580	Ni 19732	?? 4848	
63	37196	Cu 37196	ScO 1	?? -1
64	29292	Ni 5823	In 11195	?? 12274
65	18452	Cu 16642	?? 1810	
66	10508	Zn 6368	?? 4140	
67	3240	Zn 942	?? 2298	
68	4252	Zn 4252	Ce++ 1	?? -1
69	1824	Ga 1824	Ce++ 1	?? -1
70	15904	Zn 142	Ge 4175	Ce++ 1
		?? 11586		
71	2904	Ga 1196	ClAr 1	Ce++ 1
		?? 1706		
72	5580	Ge 5580		
73	264	Ge 1579	?? -1315	
74	11448	Ge 7434	?? 4014	
75	272	As 253	ClAr 20	?? -1
76	0	Ge 1579	ArAr 21	?? -1600
77	40	ClAr 7	ArArH 3	?? 30
78	0	ArArHH 1	?? -1	
79	244	Br 244		

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
80	2964	ArAr 2964		
81	556	Br 239	ArArH 318	?? -1
82	8	ArArHH 8		
83	0			
84	40	Sr 5	?? 35	
85	12	Rb 1	?? 11	
86	96	Sr 75	?? 21	
87	12	Rb 1	Sr 53	?? -42
88	620	Sr 620		
89	44	Y 44		
90	484	Zr 484		
91	192	Zr 106	?? 86	
92	18924	Zr 161	Mo 18764	?? -1
93	436	Nb 436		
94	12660	Zr 164	Mo 11696	?? 800
95	22908	Mo 20129	?? 2779	
96	23248	Zr 27	Mo 21090	Ru 3
		?? 2128		
97	14888	Mo 12075	?? 2813	
98	41160	Mo 30509	Ru 1	?? 10650
99	440	Ru 5	?? 435	
100	17020	Mo 12176	Ru 5	?? 4839
101	20	Ru 7	?? 13	
102	12	Ru 12	Pd 2	?? -2
103	0			
104	24	Ru 8	Pd 17	?? -1
105	60	Pd 35	YO 3	?? 24
106	344	Pd 43	Cd 23	ZrO 13
		?? 265		
107	196	Ag 164	YO 1	ZrO 3
		?? 28		
108	392	Pd 42	Cd 16	ZrO 5
		?? 329		
109	152	Ag 152		
110	428	Pd 19	Cd 225	ZrO 5
		?? 179		
111	480	Cd 231	?? 249	
112	436	Cd 436	Sn 81	ZrO 1
		?? -82		
113	376	Cd 223	?? 153	
114	712	Cd 523	Sn 56	?? 133
115	0	Sn 30	?? -30	
116	1548	Cd 138	Sn 1205	?? 205
117	792	Sn 641	?? 151	
118	2024	Sn 2024		
119	996	Sn 723	?? 273	
120	2696	Sn 2767	?? -71	
121	28	Sb 28		
122	312	Sn 398	?? -86	
123	80	Sb 21	?? 59	
124	600	Sn 501	Xe 1	?? 98
125	24	?? 24		
126	0	Xe 1	?? -1	
127	500	I 500		
128	12	Xe 2	?? 10	
129	28	Xe 15	?? 13	
130	56	Xe 3	Ba 19	?? 34
131	12	Xe 12		
132	52	Xe 16	Ba 18	?? 18
133	52	Cs 52		
134	356	Xe 6	Ba 447	?? -97
135	1092	Ba 1216	?? -124	
136	1372	Xe 6	Ba 1441	Ce 1
		?? -76		
137	2180	Ba 2089	?? 91	
138	13220	Ba 13220	La 1	Ce 1
		?? -2		
139	4	La 4		
140	16	Ce 17	?? -1	
141	0			
142	4	Ce 3	?? 1	
143	8	?? 8		
144	0			
145	8	?? 8		
146	8	?? 8		
147	0	BaOH 1	?? -1	
148	0			
149	0			
150	12	?? 12		
151	4	BaOH 2	?? 2	
152	24	BaOH 5	?? 19	
153	0	BaOH 5	?? -5	
154	116	BaOH 7	?? 109	
155	44	BaOH 44	LaO 1	?? -1
156	0			
157	0	BaOH 1	LaO 1	?? -2
158	0			
159	0			
160	0			
161	4	?? 4		
162	0			
163	0			
164	0			
165	4	Ho 4		
166	0			
167	0			
168	0			
169	0			

Thorium Radioactivity Remediation Data — Third Party Verification

New Energy Times Archive

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
170	0			
171	0			
172	0			
173	0			
174	0			
175	12	Lu 12		
176	0	Lu 1	?? -1	
177	0			
178	0			
179	0			
180	4	Ta 1	W 3	
181	4	Ta 4	HoO 1	??
182	436	W 388	?? 48	
183	308	W 212	HoO 1	??
184	552	W 450	?? 102	
185	12	Re 3	?? 9	
186	420	W 420		
187	4	Re 4		
188	0			
189	0			
190	0			
191	4	LuO 1	?? 3	
192	0	LuO 1	?? -1	
193	0	LuO 1	?? -1	
194	8	?? 8		
195	0			
196	4	?? 4		
197	64	Au 64	TaO 1	??
198	36	?? 36		
199	20	TaO 1	?? 19	
200	32	?? 32		
201	0			
202	0			
203	4	?? 4		
204	700	Pb 811	?? -111	
205	0			
206	14412	Pb 12924	?? 1488	
207	12080	Pb 12376	?? -296	
208	28640	Pb 28640		
209	32	Bi 32		
210	0			
211	0			
212	0			
213	0			
214	4	?? 4		
215	0			
216	4	?? 4		
217	0			
218	12	?? 12		
219	0			
220	0			
221	0			
222	0			
223	0			
224	0			
225	0			
226	0			
227	0			
228	0			
229	0			
230	0			
231	0			
232	3308	Th 3308		
233	0			
234	8	?? 8		
235	0			
236	0			
237	0			
238	0			
239	0			
240	8	?? 8		
241	0			
242	0			
243	0			
244	0			
245	0			

ANALYTE INTENSITIES

Analyte	Intensity	Response	Concentration
H	NOT MEASURED		
He	0	0.00	
Li	65	1313000.00	0.05
Be	9164	462300.00	19.81
B	0	844200.00	0.00
C	0	302500.00	0.00
N	NOT MEASURED		
O	NOT MEASURED		
F	NOT MEASURED		
Ne	0	0.00	
Na	15792	2450000.00	6.44
Mg	16190	727900.00	22.23
Al	4348	1370000.00	3.17
Si	171595	1988000.00	86.28
P	21	205700.00	0.10
S	528375	65460.00	8071.00
Cl	254928	3032.00	83990.00
Ar	8183026	0.00	
K	NOT MEASURED		
Ca	126897	2181000.00	58.17
Sc	2236	1825000.00	1.22
Ti	1557	1411000.00	1.10
V	34374	1288000.00	26.67
Cr	1510444	1227000.00	1230.00
Mn	586064	1469000.00	398.80
Fe	8052684	1217000.00	6614.00
Co	345146	941300.00	366.60
Ni	539108	548800.00	982.20
Cu	53837	432700.00	124.40
Zn	22897	347200.00	65.93
Ga	3020	1036000.00	2.91
Ge	20343	1074000.00	18.92
As	253	209900.00	1.20
Se	0	283900.00	0.00
Br	483	63280.00	7.63
Kr	0	0.00	
Rb	0	4147000.00	0.00
Sr	751	4500000.00	0.17
Y	44	5358000.00	0.01
Zr	941	5606000.00	0.17
Nb	436	4927000.00	0.09
Mo	126436	4285000.00	29.50
Ru	38	3823000.00	0.01
Rh	0	2972000.00	0.00
Pd	154	2931000.00	0.05
Ag	315	2604000.00	0.12
Cd	1811	1001000.00	1.81
In	0	2537000.00	0.00
Sn	8423	3109000.00	2.71
Sb	49	2063000.00	0.02
Te	0	859200.00	0.00
I	500	5585000.00	0.09
Xe	57	0.00	
Cs	52	6407000.00	0.01
Ba	18448	6368000.00	2.90
La	4	8567000.00	0.00
Ce	18	9979000.00	0.00
Pr	0	9765000.00	0.00
Nd	0	12130000.00	0.00
Sm	0	15540000.00	0.00
Eu	0	15610000.00	0.00
Gd	0	18250000.00	0.00
Tb	0	20530000.00	0.00
Dy	0	18210000.00	0.00
Ho	4	19470000.00	0.00
Er	0	17850000.00	0.00
Tm	0	16690000.00	0.00
Yb	0	14390000.00	0.00
Lu	12	15240000.00	0.00
Hf	0	13800000.00	0.00
Ta	4	11110000.00	0.00
W	1469	10460000.00	0.14
Re	6	9796000.00	0.00
Os	0	12340000.00	0.00
Ir	0	5489000.00	0.00
Pt	0	3593000.00	0.00
Au	64	1436000.00	0.04
Hg	0	1023000.00	0.00
Tl	0	2567000.00	0.00
Pb	54761	1304000.00	41.98
Bi	32	1022000.00	0.03
Th	3308	753400.00	4.39
U	0	805900.00	0.00
NH	NOT MEASURED		
NO	504725		
NOH	3614		
NNH	2599		
NOO	751		
ClAr	25		
ArH	9819631		
ArOH	24549		
ArAr	2988		
ArArH	320		
ArArHH	8		
ScO	11		
YO	1		
ZrO	24		
BaOH	61		

Printed 10:50 EDT May 2 1997

Data Set: jec_std
Data Set Description:
Parameter File: tq-fscan

Sample ID: sample 10
Sample Description:
Sample Type: Sample
Sequence Number: 090
Blank: Subtracted (088)
Dilution Factor: 1
Number of Repeats: 1
Time: 10:51:24 May 2 1997
Signal Profile Processing: Average
Spectral Peak Processing: Average
Units: ppb
Calibration File: 050297
Response File: current.rsp

SCAN #3 THORIUM TE

Scan #3 PROCESSD THORIUM TEST SAMPLE

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
4	4	He 4		
5	0			
6	0	Li 7	?? -7	
7	84	Li 84		
8	76	?? 76		
9	0			
10	0			
11	0			
12	0			
13	56	?? 56		
21	4	?? 4		
22	0			
23	13548	Na 13548		
24	9604	Mg 8173	?? 1431	
25	1052	Mg 1052		
26	1328	Mg 1161	?? 167	
27	2408	Al 2408		
28	221640	Si 221640		
29	14620	Si 11298	NNH 3323	?? -1
30	66516	Si 7428	NO 59065	NNH 25
		?? -2		
31	660	P 4	NO 220	NOH 657
		?? -221		
32	209116	S 209116	NO 121	NOH 3
		?? -124		
33	68	S 1673	NOH 2	?? -1607
34	524	S 9290	?? -8766	
35	0			
36	0	S 89	?? -89	
37	0			
38	2884	?? 2884		
42	8668	Ca 565	?? 8103	
43	128	Ca 128		
44	4424	Ca 1819	?? 2605	
45	2984	Sc 2984		
46	117720	Ca 3	Ti 155608	?? -37891
47	139440	Ti 142853	?? -3413	
48	1451056	Ca 159	Ti 1450898	?? -1
49	613088	Ti 108121	?? 504967	
50	136936	Ti 104785	V 165	Cr 25542
		?? 6444		
51	68556	V 68556		
52	496376	Cr 496376		
53	316716	Cr 56595	?? 260121	
54	204912	Cr 14105	Fe 220578	?? -29771
55	232568	Mn 232568		
56	3473900	Fe 3473900		
57	2965096	Fe 83001	?? 2882095	
58	181440	Fe 12507	Ni 159889	?? 9044
59	141140	Co 141140		
60	61820	Ni 61820		
61	61616	Ni 2805	ScO 15	?? 58796
62	17384	Ni 8627	?? 8757	
63	28676	Cu 28676	ScO 1	?? -1
64	94888	Ni 2546	?? 92342	
65	108588	Cu 12830	?? 95758	
66	13872	?? 13872		
67	4664	?? 4664		
68	0			
69	96	Ga 96		
70	20088	?? 20088		
71	1392	Ga 63	?? 1329	
72	10172	?? 10172		
73	0			
74	0			
75	0			
76	0			
77	0			
78	0	Kr 1	?? -1	
79	408	Br 408		
80	2076	Kr 2	?? 2074	
81	508	Br 400	?? 108	
82	28	Kr 10	?? 18	
83	60	Kr 10	?? 50	
84	48	Kr 48	Sr 3	?? -3
85	56	?? 56		

Printed 10:52 EDT May 2 1997

New Energy Times Archive

Thorium Radioactivity Remediation Data — Third Party Verification

Mass	Total Intensity	Assigned Intensities		
86	116	Kr 15	Sr 42	?? 59
87	0	Sr 30	?? -30	
88	348	Sr 348		
89	0			
90	1424	Zr 1412	?? 12	
91	308	Zr 308		
92	4528	Zr 470	Mo 4059	?? -1
93	124	Nb 124		
94	4100	Zr 478	Mo 2530	?? 1092
95	6572	Mo 4355	?? 2217	
96	7520	Zr 77	Mo 4562	?? 2881
97	4512	Mo 2612	?? 1900	
98	11304	Mo 6600	?? 4704	
99	168	?? 168		
100	3548	Mo 2634	?? 914	
101	24	?? 24		
102	20	Pd 1	?? 19	
103	4	Rh 4		
104	8	Pd 8		
105	272	Pd 17	?? 255	
106	1148	Pd 20	Cd 13	ZrO 36
		?? 1079		
107	324	Ag 121	ZrO 8	?? 195
108	492	Pd 20	Cd 9	ZrO 12
		?? 451		
109	112	Ag 112		
110	548	Pd 9	Cd 126	ZrO 12
		?? 401		
111	144	Cd 130	?? 14	
112	244	Cd 244	Sn 12	ZrO 2
		?? -14		
113	160	Cd 125	?? 35	
114	308	Cd 293	Sn 8	?? 7
115	0	Sn 5	?? -5	
116	504	Cd 77	Sn 165	?? 262
117	168	Sn 88	?? 80	
118	276	Sn 276		
119	136	Sn 99	?? 37	
120	248	Sn 378	?? -130	
121	12	Sb 12		
122	0	Sn 55	?? -55	
123	20	Sb 9	?? 11	
124	144	Sn 69	?? 75	
125	0			
126	68	?? 68		
127	700	I 700		
128	12	?? 12		
129	24	?? 24		
130	0			
131	4	?? 4		
132	4	?? 4		
133	28	Cs 28		
134	0			
135	0			
136	0			
137	0			
138	0	La 1	?? -1	
139	20	La 20		
140	0			
141	0			
142	4	?? 4		
143	12	?? 12		
144	0			
145	0			
146	0			
147	0			
148	0			
149	0			
150	8	?? 8		
151	28	?? 28		
152	0			
153	0			
154	20	?? 20		
155	0			
156	0			
157	0			
158	0			
159	0			
160	4	?? 4		
161	0			
162	0			
163	0			
164	0			
165	0			
166	0			
167	0			
168	8	?? 8		
169	20	Tm 20		
170	4	?? 4		
171	0			
172	0			
173	0			
174	0			
175	0			
176	8	?? 8		
177	20	?? 20		
178	4	?? 4		
179	8	?? 8		

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities	
180	0		
181	0		
182	0		
183	100	?? 100	
184	0		
185	4	TmO 1	?? 3
186	244	?? 244	
187	0	TmO 1	?? -1
188	0		
189	0		
190	0	Pt 1	?? -1
191	0		
192	0	Pt 1	?? -1
193	4	?? 4	
194	4	Pt 4	
195	24	Pt 5	?? 19
196	8	Pt 4	?? 4
197	28	Au 28	
198	0	Pt 1	?? -1
199	36	?? 36	
200	0		
201	4	?? 4	
202	0		
203	16	?? 16	
204	20	Pb 10	?? 10
205	0		
206	204	Pb 152	?? 52
207	188	Pb 146	?? 42
208	336	Pb 336	
209	24	Bi 24	
210	0		
211	0		
212	0		
213	0		
214	0		
215	0		
216	4	?? 4	
217	0		
218	0		
219	0		
220	0		
221	0		
222	0		
223	0		
224	0		
225	0		
226	0		
227	0		
228	0		
229	0		
230	4	?? 4	
231	80	?? 80	
232	475500	Th 475500	
233	20	?? 20	
234	0		
235	0		
236	12	?? 12	
237	0		
238	0		
239	20	?? 20	
240	0		
241	0		
242	0		
243	0		
244	0		
245	4	?? 4	

ANALYTE INTENSITIES

Analyte	Intensity	Response	Concentration
H	NOT MEASURED		
He	4	0.00	
Li	91	1313000.00	0.07
Be	0	462300.00	0.00
B	0	844200.00	0.00
C	0	302500.00	0.00
N	NOT MEASURED		
O	NOT MEASURED		
F	NOT MEASURED		
Ne	0	0.00	
Na	13548	2450000.00	5.53
Mg	10385	727900.00	14.26
Al	2408	1370000.00	1.76
Si	240364	1988000.00	120.80
P	4	205700.00	0.02
S	220122	65460.00	3362.00
Cl	0	3032.00	0.00
Ar	0	0.00	
K	NOT MEASURED		
Ca	88276	2181000.00	40.47
Sc	2984	1825000.00	1.63
Ti	1962263	1411000.00	1390.00
V	68721	1288000.00	53.32
Cr	592617	1227000.00	482.90
Mn	232568	1469000.00	158.20
Fe	3789985	1217000.00	3113.00
Co	141140	941300.00	149.90
Ni	235684	548800.00	429.40
Cu	41505	432700.00	95.91
Zn	0	347200.00	0.00
Ga	159	1036000.00	0.15
Ge	0	1074000.00	0.00
As	0	209900.00	0.00
Se	0	283900.00	0.00
Br	807	63280.00	12.75
Kr	84	0.00	
Rb	0	4147000.00	0.00
Sr	422	4500000.00	0.09
Y	0	5358000.00	0.00
Zr	2743	5606000.00	0.49
Nb	124	4927000.00	0.03
Mo	27350	4285000.00	6.38
Ru	0	3823000.00	0.00
Rh	4	2972000.00	0.00
Pd	73	2931000.00	0.02
Ag	232	2604000.00	0.09
Cd	1014	1001000.00	1.01
In	0	2537000.00	0.00
Sn	1149	3109000.00	0.37
Sb	21	2063000.00	0.01
Te	0	859200.00	0.00
I	700	5585000.00	0.13
Xe	0	0.00	
Cs	28	6407000.00	0.00
Ba	0	6368000.00	0.00
La	20	8567000.00	0.00
Ce	0	9979000.00	0.00
Pr	0	9765000.00	0.00
Nd	0	12130000.00	0.00
Sm	0	15540000.00	0.00
Eu	0	15610000.00	0.00
Gd	0	18250000.00	0.00
Tb	0	20530000.00	0.00
Dy	0	18210000.00	0.00
Ho	0	19470000.00	0.00
Er	0	17850000.00	0.00
Tm	20	16690000.00	0.00
Yb	0	14390000.00	0.00
Lu	0	15240000.00	0.00
Hf	0	13800000.00	0.00
Ta	0	11110000.00	0.00
W	0	10460000.00	0.00
Re	0	9796000.00	0.00
Os	0	12340000.00	0.00
Ir	0	5489000.00	0.00
Pt	12	3593000.00	0.00
Au	28	1436000.00	0.02
Hg	0	1023000.00	0.00
Tl	0	2567000.00	0.00
Pb	642	1304000.00	0.49
Bi	24	1022000.00	0.02
Th	475500	753400.00	631.00
U	0	805900.00	0.00
NH	NOT MEASURED		
NO	59427		
NOH	660		
NNH	3348		
ScO	15		
ZrO	69		

New Energy Times Archive

Thorium Radioactivity Remediation Data — Third Party Verification

TOTALQUANT II: COMPREHENSIVE REPORT

SCAN # 4 - U
THORIUM Te

Data Set:	jec_std
Data Set Description:	
Parameter File:	tq-fscan
Sample ID:	sample 16
Sample Description:	
Sample Type:	Sample
Sequence Number:	094
Blank:	Subtracted (088)
Dilution Factor:	1
Number of Repeats:	1
Time:	10:59:57 May 2 1997
Signal Profile Processing:	Average
Spectral Peak Processing:	Average
Units:	ppb
Calibration File:	050297
Response File:	current.rsp

Scan #4
UNPROCESSED THORIUM TEST SAMPLE

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities		
4	0			
5	0			
6	0	Li 3	?? -3	
7	32	Li 32		
8	76	?? 76		
9	0			
10	0			
11	0			
12	0			
13	80	?? 80		
21	112	?? 112		
22	0			
23	0			
24	2300	Mg 2300		
25	340	Mg 297	?? 43	
26	464	Mg 327	?? 137	
27	0			
28	0			
29	0			
30	0			
31	684	NON 684		
32	520268	S 520269	NON 3	?? -4
33	4212	S 4163	NON 2	?? 47
34	992	S 23111	?? -22119	
35	0			
36	0	S 220	?? -220	
37	0			
38	1236	?? 1236		
42	18660	?? 18660		
43	36	?? 36		
44	312	?? 312		
45	92	Sc 92		
46	0			
47	176	?? 176		
48	0			
49	0			
50	0	V 1	NAr 1	?? -2
51	276	V 276		
52	616	?? 616		
53	0			
54	56	Fe 16	NAr 41	?? -1
55	172	Mn 172	NAr 1	?? -1
56	244	Fe 244		
57	452	Fe 6	?? 446	
58	0	Fe 1	?? -1	
59	0			
60	0			
61	8	ScO 1	?? 7	
62	8	?? 8		
63	16	ScO 1	?? 15	
64	0			
65	0			
66	0			
67	0			
68	0			
69	0			
70	22332	Ge 13418	?? 8914	
71	3124	?? 3124		
72	27188	Ge 17936	?? 9252	
73	4636	Ge 5074	?? -438	
74	23892	Ge 23892		
75	0			
76	3360	Ge 5074	?? -1714	
77	0			
78	0			
79	0			
80	5724	?? 5724		
81	0			
82	4	?? 4		
83	0			
84	4	?? 4		
85	8	?? 8		
86	0			
87	0			
88	64	?? 64		
89	0			

Be = 100

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities	
90	0		
91	0		
92	0		
93	0		
94	0		
95	0		
96	0		
97	0		
98	0		
99	0		
100	0		
101	8	?? 8	
102	0		
103	0		
104	0		
105	0		
106	0		
107	8	?? 8	
108	0		
109	0		
110	0		
111	0		
112	0		
113	8	?? 8	
114	0		
115	0		
116	424	?? 424	
117	0		
118	0		
119	112	?? 112	
120	0		
121	0		
122	0		
123	0		
124	0		
125	0		
126	0		
127	84	I 84	
128	0		
129	20	?? 20	
130	0		
131	8	?? 8	
132	0		
133	0		
134	0		
135	0		
136	0		
137	0		
138	0		
139	0		
140	0		
141	0		
142	12	?? 12	
143	16	?? 16	
144	0		
145	0		
146	8	?? 8	
147	4	?? 4	
148	0		
149	0		
150	0		
151	0		
152	0		
153	0		
154	0		
155	0		
156	0		
157	0		
158	0		
159	0		
160	8	?? 8	
161	0		
162	0		
163	0		
164	0		
165	0		
166	0		
167	0		
168	0		
169	0		
170	0		
171	0		
172	0		
173	0		
174	0		
175	8	Lu 8	
176	0	Lu 1	?? -1
177	0		
178	0		
179	0		
180	0		
181	0		
182	0		
183	0		
184	0		
185	0		
186	0		
187	0		

MASS ASSIGNMENTS

Mass	Total Intensity	Assigned Intensities	
188	0		
189	0		
190	0		
191	0		
192	0		
193	0		
194	0		
195	0		
196	0		
197	16	Au 16	
198	0		
199	4	?? 4	
200	0		
201	0		
202	0		
203	0		
204	0		
205	0		
206	0		
207	0		
208	0		
209	8	Bi 8	
210	0		
211	0		
212	0		
213	0		
214	0		
215	0		
216	0		
217	0		
218	0		
219	0		
220	0		
221	0		
222	0		
223	0		
224	0		
225	0		
226	0		
227	0		
228	0		
229	0		
230	0		
231	92	?? 92	
232	1373696	Th 1373696	
233	60	?? 60	
234	16	?? 16	
235	0		
236	0		
237	0		
238	0		
239	0		
240	0		
241	0		
242	0		
243	0		
244	0		
245	4	?? 4	

ANALYTE INTENSITIES

Analyte	Intensity	Response	Concentration
H	NOT MEASURED		
He	0	0.00	
Li	35	1313000.00	0.03
Be	0	462300.00	0.00
B	0	844200.00	0.00
C	0	302500.00	0.00
N	NOT MEASURED		
O	NOT MEASURED		
F	NOT MEASURED		
Ne	0	0.00	
Na	0	2450000.00	0.00
Mg	2922	727900.00	4.01
Al	0	1370000.00	0.00
Si	0	1988000.00	0.00
P	0	205700.00	0.00
S	547651	65460.00	8368.00
Cl	0	3032.00	0.00
Ar	0	0.00	
K	NOT MEASURED		
Ca	0	2181000.00	0.00
Sc	92	1825000.00	0.05
Ti	0	1413000.00	0.00
V	277	1288000.00	0.21
Cr	0	1227000.00	0.00
Mn	172	1469000.00	0.12
Fe	264	1217000.00	0.22
Co	0	941300.00	0.00
Ni	0	548800.00	0.00
Cu	0	432700.00	0.00
Zn	0	347200.00	0.00
Ga	0	1036000.00	0.00
Ge	65386	1074000.00	60.82
As	0	209900.00	0.00
Se	0	283900.00	0.00
Br	0	63280.00	0.00
Kr	0	0.00	
Rb	0	4147000.00	0.00
Sr	0	4500000.00	0.00
Y	0	5368000.00	0.00
Zr	0	5606000.00	0.00
Nb	0	4927000.00	0.00
Mo	0	4285000.00	0.00
Ru	0	3823000.00	0.00
Rh	0	2972000.00	0.00
Pd	0	2931000.00	0.00
Ag	0	2604000.00	0.00
Cd	0	1001000.00	0.00
In	0	2537000.00	0.00
Sn	0	3109000.00	0.00
Sb	0	2063000.00	0.00
Te	0	859200.00	0.00
I	84	5585000.00	0.02
Xe	0	0.00	
Cs	0	6407000.00	0.00
Ba	0	6368000.00	0.00
La	0	8567000.00	0.00
Ce	0	9979000.00	0.00
Pr	0	9765000.00	0.00
Nd	0	12130000.00	0.00
Sm	0	15540000.00	0.00
Eu	0	15610000.00	0.00
Gd	0	18250000.00	0.00
Tb	0	20530000.00	0.00
Dy	0	18210000.00	0.00
Ho	0	19470000.00	0.00
Er	0	17850000.00	0.00
Tm	0	16690000.00	0.00
Yb	0	14390000.00	0.00
Lu	8	15240000.00	0.00
Hf	0	13800000.00	0.00
Ta	0	11110000.00	0.00
W	0	10460000.00	0.00
Re	0	9796000.00	0.00
Os	0	12340000.00	0.00
Ir	0	5489000.00	0.00
Pt	0	3593000.00	0.00
Au	16	1436000.00	0.01
Hg	0	1023000.00	0.00
Tl	0	2567000.00	0.00
Pb	0	1304000.00	0.00
Bi	8	1022000.00	0.01
Th	1373696	753400.00	1823.00
U	0	805900.00	0.00
NE	NOT MEASURED		
NON	688		
NAr	41		

New Energy Times Archive

Thorium Radioactivity Remediation Data — Third Party Verification

Commercial Lab Analysis of Macroscopic Flake from Cincinnati Group Transmutation Cell

DATA CHEM LABORATORIES

CINCINNATI OFFICE:
4388 Glendale-Milford Road
Cincinnati, Ohio 45242-3706
513-733-5336 Fax: 513-733-5347

4/23/97

SUBMITTED TO:
Stan Gleeson
HOLLOMAN AND ASSOCIATES
9772 PRINCETON GLENDALE RD., SUITE 25
CINCINNATI, OH 45246

REFERENCE DATA

Client Sample Nos.: PS and CS
P.O. Number: Not available
Sample Location: Not available
Sample type: Bulk
Method Reference: Particle Characterization by TEM
DCL Set ID No.: 97-T-2060
DCL Sample ID Nos.: 97-13491 and 97-13492
Preparation Date: 4/13/97 Analysis Date: 4/13-14/97

We certify that the samples indicated on the following data sheets were analyzed by Transmission Electron Microscopy (TEM) to characterize he amounts and types of materials present. Samples were prepared by direct mounting of the tweezer-picked particles onto a TEM grid by means of an adhesive agent (ink correction fluid). Analysis was performed on a Phillips CM-12 TEM with energy dispersive X-ray analysis (EDXA) capabilities. Particle Morphologies, selected area electron diffraction (SAED) patterns and EDXA spectra were used to determine particle types (when applicable). Results apply only to portions of samples analyzed and are tabulated on the following data sheet(s). DataChem Laboratories will dispose of bulk samples after 60 days unless other arrangements are made.

DataChem Laboratories
TEM Bulk Asbestos Analytical Report
DCL Sample Set ID: 97-T-2060
Client: Cincinnati Group
Sample Location: Not Available

ANALYSIS DATA
Calibration Date: 1/10/97
EDXA Resolution: 164.9 keV
Accelerating Voltage: 100 keV

Magnification: 9,900 X
Calibration constant: 1 cm = 1.01 μm
Camera Constant: 33.6 mm-Å

Sample Preparation:

A tiny drop of an ink correction fluid was placed near the center of a TEM grid. A few flakey particles with reddish yellow color picked up from the sample boat with tweezers were deposited onto the edges of the solidifying correction fluid. The correction fluid was left to solidify completely for about 5 minutes.

Transmission Electron Microscope grid on which the copper-containing flake (dark piece in center) is mounted on solidified correction fluid (large gray area). ***Photo courtesy: Cincinnati Group***

General Description of Material Observed on Grid:

The sizes of the particles observed range from about 4-5 micron to more than 100 μm in longest dimension. A few large particles appear to be holding on the edge of the correction fluid. The correction fluid material was distinguished from the deposited particles by its appearance of a viscous fluid containing very small particles smeared onto the grid. In addition, the image contrast for deposited particles from the sample material under analysis is much higher than the fluid correction material.

Several EDXA spectra obtained from various sample portions are attached. The sample portions that produced the spectra and features noted on the spectra are described below:

EDXA Spectra No. 1 and 2 are from the thin edge of a particle where several cubic and tetragonal crystals embedded in a matrix of polycrystalline material (grain size of <0.2-0.3 microns). Both of these spectra were obtained by focusing the beam in an area of interlocking crystals and thus should represent the compositional makeup of the crystals. However, it is more than likely that the matrix has contributed to the spectra. The dominant elements in these spectra (based on peak height) are Cu, Fe, Ni, Cr, Ti, and lesser amounts of Si, Th, K, V, and S.

EDXA Spectra No. 3 and 4 were obtained with the hope of amplifying the differences in composition between the matrix and the embedded crystals described in spectra No 1 and 2. No. 3 is from a large crystal-free region of what is termed herein as matrix, and No. 4 is obtained with the beam focused directly on a crystal. A comparison of No. 3 and No. 4 Spectra shows differences in the relative peak heights where all peaks but Fe appear to be smaller in intensity. Although all of these four spectra were obtained in sample areas very similar to the one another and thought to have the same general composition, a major change in composition appears to occur in that Cu, the most dominant peak in Spectra No. 1 and 2, is replaced by Fe in Spectra No. 3 and 4 as the most dominant peak. This indicates the compositional variability within the sample, even in areas of apparent textural homogeneity .

EDXA spectra No. 5 and 6 were obtained to show that the Cu peaks in the spectra are not just an artifact of using a Cu grid. After 25 seconds of collection time, a grid area with no apparent particles in it produces a Cu peak with a 147 counts (147 CNT, recorded at the lower left corner of the spectrum). When the spectrum is collected from a particle with a flaky shape and other features very similar to what has been termed as matrix (only at a few microns away from where the Spectrum #5 was obtained), the spectrum shows a Cu peak with 1594 counts. This difference of approximately ten fold in the X-ray count is, in our opinion, a compelling indication that Cu is present in the particle analyzed.

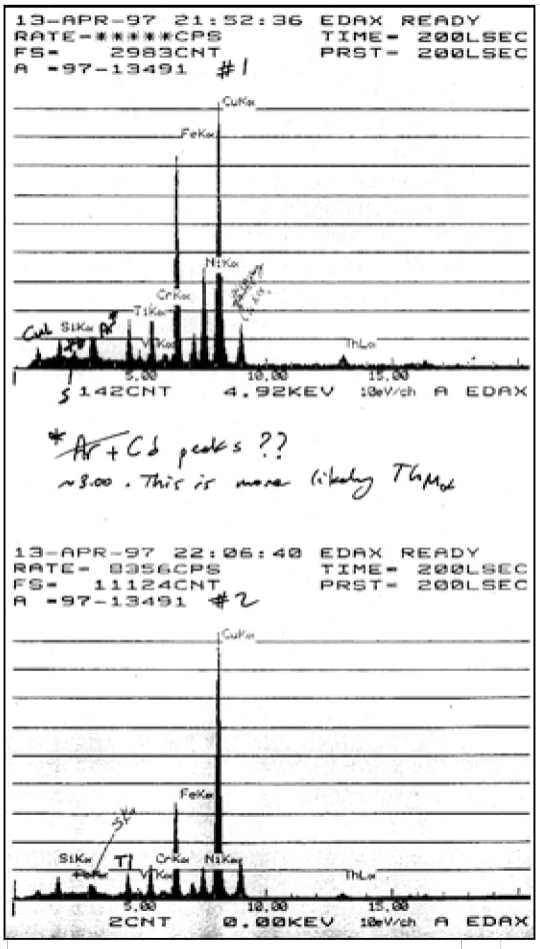
Conclusion:

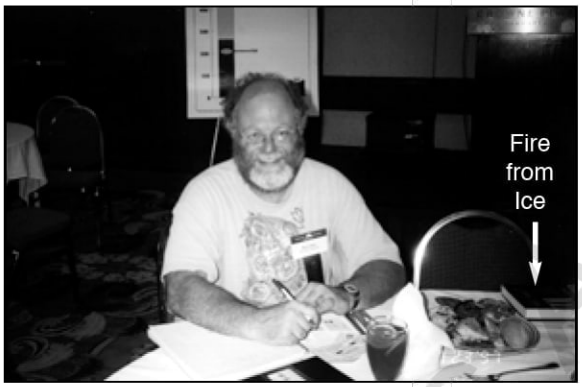
The bulk of material retained on the grid is composed of a "matrix," which appears to be a very fine-grained, polycrystalline substance. Based on the elemental peak heights, this material appears to be composed predominantly of Fe, Cu and Cr with minor Si, Th, Ti, Ni, and S, although relative peak heights are variable. The crystals that are observed embedded in the matrix also have a variable composition similar to the "matrix" in all the elements they contain. However, there appears to be more Fe in the crystals than there is in the matrix. There also are lesser differences in the amounts of the minor elements present. A few smaller, leaf-like particles have a very similar texture to the matrix material when examined at higher magnification. These showed higher Cu peaks than the Fe peaks and may indicate a higher Cu content than Fe in the smaller flakes.

(signed) Kenan Cetin Analyst
(signed) Anna Marie Ristich Section Manager

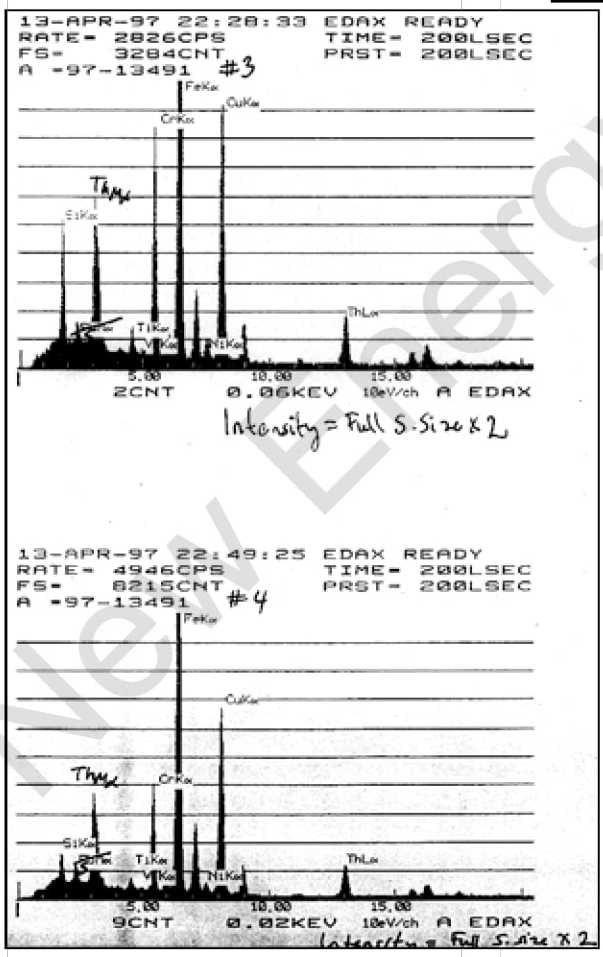
New Energy Times Archive

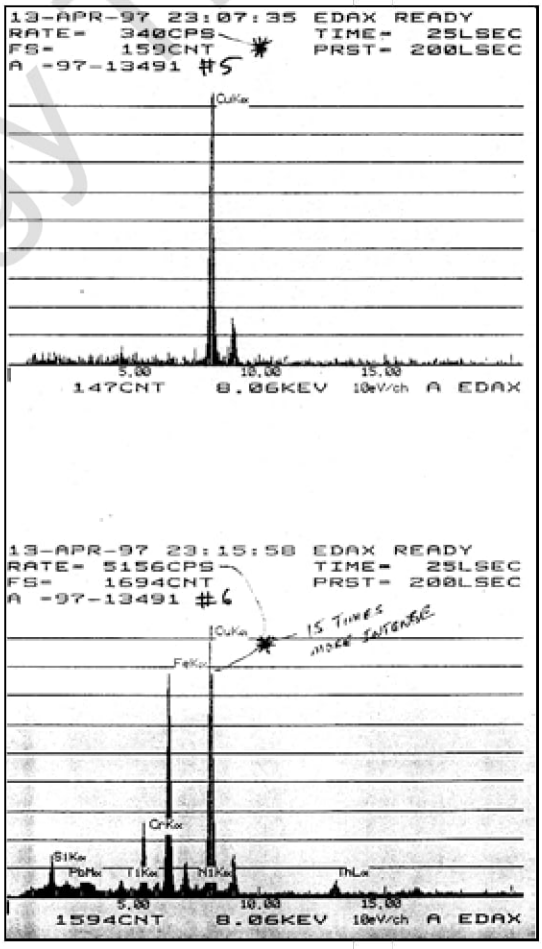
Cold Fusion Ice Cream?





Ben Cohen of *Ben and Jerry's* Ice Cream Signing His and Jerry's Book, *Double-Dip* to Gene Mallove at "Making a Profit While Making a Difference" Socially Responsible Investing Meeting in New York City, July 22-23, 1997





Like Cold Fusion, it is an idea that just might be *crazy enough to work!* Why not name an ice cream flavor "Cold Fusion"— perhaps it would be a harmonious *FUSION* of several delicious flavors?

In an effort to promote this perhaps not-so-wild idea, I traded books with Ben Cohen of *Ben and Jerry's* famous Ice Cream. He got *Fire from Ice* in return, and I got his signed, *Double-Dip*, by Ben Cohen and Jerry Greenfield, (Simon and Schuster, 1997). The two socially conscious ice-cream tycoons (sales last year were $161 million) are well-known for their far-out approach to doing business while trying to change the world for the better. In fact, that is exactly what their book is about. Read it!

So, if they really take *Infinite Energy* and cold fusion seriously—as one of the best ways to change the world—perhaps they *will* take up my suggestion in NYC for the new *B&J* ice cream flavor. That sure would make *Cold Fusion* a matter for discussion— as power VIP's savored the confection at business meetings! Jerry inscribed my copy of his book:

"Keep on Licking and Laughing!" —*Gene*

New Energy Times Archive

Cold Fusion / Cold Fission to Account for Radiation Remediation

Prof. Robert T. Bush
Physics Department, California State Polytechnic

ABSTRACT

In a paper delivered at the Texas A&M Conference on Low Energy Nuclear Reactions in 1996, "Some Theoretical Observations Upon Lattice-Assisted Nuclear Reactions in an Electrolytic Cell with Pd (Cathode) and Pt (Anode)," the author introduced a nuclear model, which gave theoretical predictions in good agreement with the nuclear products and isotopic abundance shifts detected experimentally by T. Mizuno of Hokkaido University for a Pd/Pt electrolytic cell (reported in *Infinite Energy*, Issue #7). Application is made here to the phenomenon of "radiation remediation" observed by *The Cincinnati Group*.

Explanation of Cold Fusion / Cold Fission:

For cold fusion, according to the model, a particle such as a proton, deuteron, or triton has its probability for quantum-mechanically tunneling into another nucleus vastly increased by the presence of an electron near enough to the positive charge so that the width and height of the Coulomb barrier are both reduced. In cold fission, the number of electrons has been so increased over the cold fusion case that, at least charge-wise, protons seem like neutrons. In essence then, the resulting nucleus finds itself with too many "neutrons" for the number of protons present. Thus, the fissioning results in order to produce nuclear products that have neutron-to-proton ratios that place them nearer to the well-known nuclear stability, curve. ("Cold fusion" and "cold fission" might aptly also be termed, respectively, "electron induced fusion" and "electron induced fission.")

Agreement with Mizuno's Experimental Results:

The model accounts for the large amount of Xe produced in Mizuno's experiment by employing three principal reactions: (1) cold fission of the platinum that plates over from the Pt anode onto the Pd cathode, (2) cold fusion involving the addition of a deuteron to I-134 and I-129 to produce Xe-136 and Xe-131, respectively, and, (3) cold fission of the Pd of the cathode. The model accounts for the production of Mg, K, Ca, and Ti as associate products in the production of Xe by the cold fissioning of Pt and Pd, and gives good agreement with Mizuno's data on the interesting abundance shifts for the stable isotopes of Xe, and of Mg, K, Ca, and Ti. Table 3 [Editor's Note: This is from a longer paper to appear in a subsequent issue of *Infinite Energy*.] shows a section of one page employed to determine the model's results for Xe. As an example, consider the intersection of the second row and the last column: the interpretation is that one nucleus of Ca-43 is the result of the cold fissioning of Pt-198, which also yields one nucleus each of Mg-24 and Xe-131. The equation in its entirety is as follows:

$$12\,({}_{-1}e^{o}) + {}_{78}\overset{0+}{Pt}{}^{198} \rightarrow {}_{54}\overset{3/2+}{Xe}{}^{131} + {}_{12}\overset{0+}{Mg}{}^{24} + {}_{20}\overset{7/2-}{Ca}{}^{43} + 20\,({}_{-1}e^{o}) + 8\,\bar{\nu}_e.$$

The Q-value of 111 Mev for this reaction implies that 111 Mev should be given off. However, this energy would not be available as excess heat since, while some of the energy would go into the kinetic energy of the emerging electrons (betas), the vast preponderance of the energy would be carried away by the eight electron antineutrinos. The eight antineutrinos are necessary to conserve "lepton number."

Application to Radiation Remediation:

That this model, which gives such good agreement with Mizuno's experimental results, should be applied to the phenomenon of "radiation remediation" is readily apparent. Table 7 shows several reactions illustrating the cold fissioning of thorium-232 The predominant reactions in all cases are cold fissionings. However, again, one would not expect to observe excess heat in the lattice in these reactions since excess energy will be carried off by neutrinos. The fact that the laboratory of *The Cincinnati Group* is still standing—and not blown up in a nuclear explosion—can be attributed to these electron antineutrinos.

Table 3 -

		0.0127%	0.78%	32.9%	33.8%	25.3%	7.21%
${}_{78}Pt \rightarrow$		(0+) 190	(0+) 192	(0+) 194	1/2- 195	(0+) 196	(0+) 198
	${}_{54}\overset{3/2+}{Xe}{}^{131}$ 21.18%	—	${}_{16}\overset{3/2-}{S}{}^{37}$ 5 m	${}_{18}\overset{3/2-}{Ar}{}^{39}$ 269 y	${}_{18}\overset{0+}{Ar}{}^{40}$ 99.60%	${}_{18}\overset{7/2-}{Ar}{}^{41}$ 1.83 h	${}_{20}\overset{3/2-}{Ca}{}^{43}$ 0.145%
	—	—	—	—	${}_{19}\overset{4}{K}{}^{40}$ 0.0118%	${}_{20}\overset{3/2-}{Ca}{}^{41}$ 1.03×10^5 y	${}_{21}\overset{7/2-}{Sc}{}^{43}$ 3.9 h
	—	—	—	—	${}_{20}\overset{0+}{Ca}{}^{40}$ 96.97 ms	${}_{21}\overset{7/2-}{Sc}{}^{41}$ 596 ms	${}_{22}\overset{7/2-}{Ti}{}^{43}$ 510 ms

Table 7

(4) $12\,({}_{-1}e^{o}) + {}_{90}\overset{0+}{Th}{}^{232} \rightarrow {}_{12}\overset{5/2+}{Mg}{}^{25} + {}_{66}\overset{0+}{Dy}{}^{160} + {}_{22}\overset{5/2-}{Ti}{}^{47} + 22\,({}_{-1}e^{o}) + 10\,\bar{\nu}_e$

(5) $12\,({}_{-1}e^{o}) + {}_{90}\overset{0+}{Th}{}^{232} \rightarrow {}_{12}\overset{5/2+}{Mg}{}^{25} + {}_{66}\overset{0+}{Dy}{}^{158} + {}_{22}\overset{7/2-}{Ti}{}^{49} + 22\,({}_{-1}e^{o}) + 10\,\bar{\nu}_e$

(6) $12\,({}_{-1}e^{o}) + {}_{90}\overset{0+}{Th}{}^{232} \rightarrow {}_{12}\overset{5/2+}{Mg}{}^{25} + {}_{66}\overset{0+}{Dy}{}^{156} + {}_{23}\overset{7/2-}{V}{}^{51} + 23\,({}_{-1}e^{o}) + 11\,\bar{\nu}_e$

(7) $12\,({}_{-1}e^{o}) + {}_{90}\overset{0+}{Th}{}^{232} \rightarrow {}_{12}\overset{0+}{Mg}{}^{24} + {}_{66}\overset{5/2+}{Dy}{}^{161} + {}_{22}\overset{5/2-}{Ti}{}^{47} + 22\,({}_{-1}e^{o}) + 10\,\bar{\nu}_e$

Stan Gleeson, one of *The Cincinnati Group* inventors
(Photo: by Gene Mallove, in Cincinnati,1997)

New Energy Times Archive

Eagleton's Theory of the CG's LENT Process

by Robert W. Bass

Prof. of Physics & Astronomy, BYU (1971-81), retired

Registered Patent Agent 29,130, P.O.Box 1238, Pahrump, NV 89041

More than two years ago the Cincinnati Group (CG), upon the recommendation of Hal Fox, whom they credit with awakening their interest in Radwaste Remediation (RR) as related to but distinct from their original interest in Cold Fusion (CF), invited me to witness their demonstrations and to advise them regarding Intellectual Property Law (which I am licensed to practice before the US PTO). Hal Fox had already witnessed several of their experiments, and in fact helped the CG to construct their first heavy-duty Power Supply System with his own hands.

I was so awed and amazed at what I saw that I at once turned around and invited Profs. Robert T. Bush and Robert D. Eagleton of Cal Poly Pomona (for whom I had already drafted both CF and RR patent Applications), and Dr. Gene Mallove, Editor of *Infinite Energy* Magazine, to join us. Dr. Mallove and one of the CG both made videotapes of what I believe will be historically important discoveries being made, *as they were being made!*

In the last sentence, I refer not only to CF and RR and to the general field of Low Energy Nuclear Transmutations (LENT), a field founded by John Bockris under the rubric of LENR [though in his latest two letters to me he has adopted my own acronym of LENT], but I refer also to another startling discovery by the CG that has not yet been disclosed or even hinted at, and which not even the CG had seen before the day that Bush, Eagleton, Mallove & Bass were present as witnesses!

I have either drafted the original patent Applications, or worked on the Office Action Response (OAR), to 4 of the 7 known approaches to RR about which Hal Fox has written in both *Fusion Facts* Newsletter and *New Energy News* Newsletter and his archival *New Energy Journal* (which is now Abstracted in *Chemical Abstracts* and other international abstracting publications). In order to assure my various clients that at least in my own mind I regarded their various approaches as "patentably distinct" I formulated the following *metaphor* for keeping the various approaches conceptually separated.

This is a metaphor referring to military projectiles. Briefly, arsenals contain *inter alia*: (1) shotguns; (2) machine guns; (3) Gattling guns; (4) cruise missiles.

Inventors Ron Brightsen *et al* [which includes Gene Mallove] have a pending patent pertaining to RR by photonuclear reactions which I regard as a "photon shotgun" approach. These patent rights belong to Clustron Sciences Corp. of Alexandria, VA.

Bush & Eagleton have patents pending both on CF & RR by what I regard as a "proton machine-gun" because the theory which Bob Bush produced pertains to nucleon transfer of only one or two protons at a time. These patent rights belong to Proteus Processes, Inc. of Denver, CO.

Then more than 18 months ago, Bob Eagleton sent me a lengthy theoretical paper which I found both fascinating and impressive, but which he asked me to hold in confidence until he could gather further evidence as to its validity or lack thereof. In this theory, up to several *scores* of protons can jump into a target nucleus *simultaneously!* Moreover, by using three well-established and strict Conservation Laws (pertaining to Baryon Number, Charge Number, and Energy), Dr. Eagleton developed a theory and a computer program to list all possible nuclear transmutations and daughter-products which satisfied the 3 Conservation Laws, and then to list them in order of descending Q (or excess energy). There are many "minimum" principles in physics, and it seems reasonable to postulate that (just as we have Least Action in Optics & Hamiltonian Mechanics) the most probable nuclear reaction would be the Least Q reaction. Because one envisages a score or two scores of protons being fired into a nucleus simultaneously (something hitherto considered too strange to even contemplate — though not absurd in view of certain Resonant Transmission ideas initiated by Eagleton), I began calling this approach the "proton gattling-gun" approach.

Most recently, with the announcement by Ken Shoulders that he has empirical evidence that his electron clusters can pick up and can carry protons piggy-back, there has been formulated the [non-neutral] Plasma-Injected Transmutation (PIT) concept of Fox, Jin and Bass (which will be glossed over here as it has been explained in detail in the Fox-edited publications cited above). The important discovery of Fox & Jin is that acceleration of 10^{11} electrons through 100 eV will at no discernible extra energy cost (when figures are rounded off) accelerate the up to 10^6 passenger protons through 200 keV, and thereby permit classical "hot" fusion and other conventional nuclear reactions hitherto thought to be possible only in giant, mega-cost, mega- volt particle-accelerator laboratories as funded by the DOE.

Thus the PIT approach promises to permit Table-Top particle accelerators competitive with classical high-energy systems! I began calling this approach the "proton cruise-missile" approach. These patent rights improve upon earlier patents of Shoulders and are owned by CAI, a subsidiary of the Fusion Information Center of Salt Lake, UT.

Personally, I believe that all four approaches can be and already have been made to work. Comparisons between them will require a vast amount of future R&D work yet to be done.

However, I am writing this note in order to apologize to Bob Eagleton for my clumsy attempts to explain the CG LENT process by means of the PIT theory. When I posted this on the Internet, I got quite rightly a large number of queries such as "why were not the CG boiled by the 700 kW which your proposed one-proton and two-proton reactions [to explain their transmutation of Thorium into useful metals, principally Titanium & Copper] necessarily entail?"

Professor Eagleton has now refreshed my memory (about which there can be no doubt, because at the time I gave him a Witnessed Affidavit of Understanding of, and of Confidentiality pertaining to, his unique and pioneering ideas). Apparently because this paper got misplaced in inaccessible dead storage some 19 months ago, I completely forgot about it until Bob Eagleton sent a FAX copy to the Cincinnati Group which refreshed my memory.

The testing methods used by the CG neglect the light elements (some of which are not observable with an ICP/MS unless special efforts are made), so further scientific analyses of successful CG/LENT processings must be made in order to validate or invalidate the following Eagleton-discovered possible reactions. Both reactions, however, produce the most obvious products of the CG/LENT process and come so close to achieving Conservation of Mass (another physical law NOT invoked here, because of Einstein's well-known equivalence of mass M and energy E via $E = Mc^2$) that the actual Q is smaller

New Energy Times Archive

than 10^{-5} amu. (So *no* roasted CG!) One is:

(1) $_{90}Th^{232} + 38(_1H^1) \Longrightarrow$

$6(_2He^4) + 2(_{29}Cu^{65}) + 3(_8O^{16}) + 34(_1H^2)$.

The reader who knows how to count neutrons and protons can verify that the Charge Number conserved is 128 and that the Baryon Number conserved is 270. Also by applying the Einstein relation just quoted, and using the Table of isotope masses on the Brookhaven National Lab's website (which is good to as many decimal places as known) the diligent reader can verify that the excess heat released during reaction (1) is $Q = 9.65 \times 10^{-6}$ amu, which is, in the present context, relatively negligible. Thus by assuming unnoticed *gasses* Helium-4, Oxygen-16 and Deuterium, one can account for the *ANEUTRONIC, ATHERMAL* conversion of Thorium into Copper-65.

An even lower-Q reaction, which will account for the aneutronic/athermal transmutation of Thorium into Titanium-49, is:

(2) $_{90}Th^{232} + 45(_1H^1) \Rightarrow$

$2(_2He^3) + 5(_2He^4) + {}_{22}Ti^{49} + 6(_8O^{16}) + {}_8Ar^{40} + 33(_1H^2)$.

Thus by assuming that the noble *gas* Argon-40, like Helium-3 and Helium-4, as well as Oxygen-16 and Deuterium have been overlooked in the daughter-product analysis, one can account for the conversion of Thorium into Titanium-49 without production of Kilowatts or Megawatts of excess energy (as required by the simpler reactions which I earlier posted on the Internet as trial balloons). In the case of (2) the conserved Charge Number is 135, and the conserved Baryon Number is 277.

I am urging Eagleton to publish the rationale behind his important LENT computer-program for listing all possible relevant reactions (the above being only two of scores that could be considered), and to explicate his novel Resonance Theory which seems quite plausible to me, and so receive for this amazing discovery in Nuclear Physics the professional recognition which he obviously deserves. (If the theory is imperfect he will confess human errors but if the theory pans out, then he will note that it followed upon serious fasting, prayer & meditative seeking of Divine Inspiration.) —Bob Bass

Just a few.....Excerpts from a Transcript of the Video Tape

Free Energy: The Race To Zero Point

This Video tape is available from Cold Fusion Technology for only $34.95 plus $5.00 shipping = $39.95
($49.95 for outside North America)
See ad on back cover.
Cold Fusion Technology, Inc.
P.O. Box 2816, Concord, NH 03302-2816

HOST (off camera):

Even before Tesla, the groundwork that would lead to free energy had been pioneered by great scientists like Michael Faraday and James Clerk Maxwell. In 1831 Faraday modeled his rotating magnet and disc generator after the Earth, whose rotation around a molten metal core keeps the planet spinning in a self-sustaining magnetic field. His work later resulted in the development of the dynamo. Also called a homopolar or unipolar generator, the Faraday generator provides the basis for much of what is being done today in the electromagnetic approach to free energy, such as with Bruce DePalma's "N" Machine and Paramahamsa Tewari's Space Power Generator. Repeated experiments have detected anomalous electrical outputs greater than that used to rotate the disc, but friction and voltage limitations have hampered efficiency and therefore widespread acceptance.

James Clerk Maxwell, best known for his Maxwell's Equations, is reputed to have set things straight with his theories of electrical properties in a way that eliminates zero point energy. But Maxwell's more advanced work allowed for the existence of an ether, a substance finer than air, which since the time of Plato had been considered a scientific fact.

TOM BEARDEN:

The prevailing belief of the time was that the vacuum was a thin material fluid, the so-called material ether, which we know today is false. The ether is there but it's not the observable material fluid. Faraday had re-established this notion of lines of force, but he thought the electromagnetic field or the electromagnetic disturbances in the ether so to speak was really twanging strings, the strings were under tension and when you had a disturbance what you really did was pluck the strings. Now Maxwell states very clearly that he set about to actually capture exactly what Faraday was doing in his lines of force in the theory, and that's what he did. Maxwell's actual theory is 20 equations and 20 unknowns, in quaternians, which is a higher topology algebra. You can do things in that that you can't dream of, in doing in tensors, and that you certainly can't do in vectors and you certainly can't do with the theory that started our universities. All that remains to be rediscovered and uncovered.

MORAY KING:

Most of our scientific community actually believes that empty space, the nature of space itself, is completely empty, devoid of anything. And, historically, it's very interesting, because in the 1800s, and even earlier, they believed there was an ether, an all-pervading substance filling up space. And in 1905, when relativity theory became very popular, they said, "Well, we don't need this ether. Empty space is empty." Then, 25 years or 20 years later, in 1925, when quantum mechanics comes into play, all of a sudden, a new energy appears in the equations of quantum mechanics and it has to be there to make the equations work, and it has to do with fluctuations of electromagnetic field energy and a very high frequency that interacts with everything. And they called this the "zero-point energy," and it turns out that all the elementary particles interact with this energy, and it becomes a potential energy source. That's what we're discovering today.

BRIAN O'LEARY:

Free energy is basically, and another word for it is "zero point energy", it's energy that is contained within the vacuum of space and which is virtually undetectable by any traditional means. In fact, the energy is homogeneous and isotropic, the same everywhere, the same in all directions. And because of that trying to extract it or measure it is sort of like the problem of trying to weigh a beaker of water underneath the surface of the ocean. What do you measure with respect to what? And that's been the physicist's dilemma, and we've gone down one very large cul-de-sac this century, the cul-de-sac being that there is no such thing as consciousness, there is no such thing as this zero point field or this place from which the energy can come. And, the answer now appears to be yes, because theoretical physics and a number of experiments in quantum mechanics show very clearly the existence of this all-pervasive electromagnetic field called the zero point field.

TOM BEARDEN:

The term "vacuum" has been used in several totally different senses. Some engineers use it to mean you just pump out all the air and that's called a vacuum and that's vacuum technology, that's not what we're talking about. We're talking about empty space-time. We know today, for example, the Lamb Shift in quantum mechanics showed that this exchange of energy between the vacuum and the charged particles is in fact real and generates real effects, and you can measure it, and he was given the Nobel Prize, Lamb

Continued on page 43

Non-commercial use only

Cold Fusion and The Future

Part 2 — A Look at Economics and Society

by Jed Rothwell

. . . about two or three years back, I did a first assessment of what the first successful device would be worth and it came out at about 300 trillion dollars.

Martin Fleischmann, Interview, *Infinite Energy* , Issue #11, p. 10.

For the expanding dynamic economy of America, the sky is indeed the limit. Now more than ever we must have confidence in America's capacity to grow. Guided by electronics, powered by atomic energy, geared to the smooth, effortless workings of automation, the magic carpet of our free economy heads for distant and undreamed horizons. Just going along for the ride will be the biggest thrill on earth!

"Calling All Jobs," National Association of Manufacturers, New York, October 1957, p. 21.

Considerable injury has been done to the proprietors of the improved frames. These machines were to them an advantage, inasmuch as they superseded the necessity of employing a number of workmen, who were left in consequence to starve. By the adoption of one species of frame in particular, one man performed the work of many, and the superfluous labourers were thrown out of employment. . . . The rejected workmen, in the blindness of their ignorance, instead of rejoicing at these improvements in arts so beneficial to mankind, conceived themselves to be sacrificed to improvements in mechanism. In the foolishness of their hearts they imagined that the maintenance and well-doing of the industrious poor were objects of greater consequence than the enrichment of a few individuals by an improvement, in the implements of trade, which threw the workmen out of employment, and rendered the labourer unworthy of his hire.

George Gordon, Lord Byron, describes the Luddites during the Debate on the Frame-work Bill in the House of Lords, February 27, 1812

No more hatreds, no more self-interests devouring one another, no more wars, a new life made up of harmony and light prevails.

Victor Hugo, describing the impact of lighter-than-air balloon flights on society, 1842[1]

In Part 1, I described some of the gee-whiz technology we can look forward to with cold fusion. In this issue, I would like to consider more nebulous questions. How will this affect society and the economy? Will it cause an economic boom, or massive unemployment? I think it could go either way. The outcome will depend on policies shaped by business leaders, politicians, and voters. Cold fusion may cause more unemployment than any previous labor-saving invention. It will eliminate jobs in energy, the biggest industry in the world. I fear that cold fusion will cause social disruption, because people are better at inventing new machines than they are at devising new social institutions.

Visionaries like Haldane, Von Neumann and Clarke are often ridiculed for predicting that nuclear power would become "too cheap to meter," but in the long run they will be vindicated.

A Gold Mine

Energy is the biggest industry on earth. It is the most valuable commodity: everyone needs it, every industry, vehicle, and building consumes it. People are mesmerized by the gigantic profit potential of cold fusion. Martin Fleischmann may have set a new record here when he estimated the value of a successful cold fusion device at "about 300 trillion dollars" over an unspecified period. I presume this is based on the cost of the fossil fuel we will consume if we do not adapt cold fusion. I disagree with his estimate. In spite of today's gigantic energy industries, in the long run I do not think cold fusion will earn much money, certainly not trillions of dollars. The individual scientists, engineers and venture capitalists who perfect the technology may become wealthy, but corporations devoted to cold fusion will never play a large role in the economy the way oil and coal companies do today. Instead, I predict the energy sector will wither away. The total market value of energy per annum worldwide in next century will be zero. Visionaries like Haldane, Von Neumann and Clarke are often ridiculed for predicting that nuclear power would become "too cheap to meter," but in the long run they will be vindicated.[2]

In forty years when the changeover is complete and the Hoover dam is shut down, nobody will buy or sell energy. People will generate as much as they need, when and where they need it. You cannot charge a customer for something he makes himself with his own machine. There is no practical way to meter use or collect revenue. It would be like trying to charge a person every time he watches a video tape of his family vacation. You can only collect money for cold fusion once, when you sell the machine. At first, manufacturers will sell cold fusion powered machines at a premium, but competition will soon push down the price. Eventually, cold fusion automobiles, refrigerators, furnaces and other equipment will cost no more than today's fossil fuel models. Cold fusion will be a gold mine, but only for consumers, not manufacturers. Nobody will earn $300 trillion selling cold fusion energy. The $300 trillion which would otherwise have been spent on fuel will be spent on a broad

Infinite Energy Archive

range of things instead, from consumer goods, to gambling, education, and the military. Perhaps it will not be spent on anything, and the world economy will shrink by $300 trillion.

First a toy, then a luxury, then a necessity

Successful technology goes through four stages. When first introduced, it is a high-tech toy for hobbyists and people who enjoy playing with frivolous, novel, unpredictable, unstable, and generally useless gadgets, like the automobile circa 1900 or the personal computer in 1977. The first personal computers came without disks or even video monitors in some cases. The first automobiles were toys for wealthy young men with a talent for roadside repair. In stage two the machine becomes a luxury item. It is still inordinately expensive, but more reliable. It no longer takes an expert to operate. It has many advantages over the older technology. By 1905, automobiles could be operated by untrained people. They were faster than horses, reasonably comfortable to ride in, and weather-proof. In the third stage the machine is perfected, mass produced, and made safe and idiot-proof. It becomes a necessity to most people. The automobile entered this stage on August 12, 1908 when Ford introduced the Model T for $850.[3] Personal computers gradually entered it in the late 1980s. Finally, in stage four, the cost of the machine falls dramatically and it becomes so reliable that it replaces the older technology. The U.S. horse population peaked in 1929 and declined rapidly after that.[4] Sometime around 1992, computers spread to every business. Manual bookkeeping with handwritten ledgers became a lost art. As a machine passes these stages, social attitudes toward it change in predicable ways. In the beginning people attack it as elitist or belittle it as impractical. ("Get a horse!") Later, they cannot imagine how they lived without it.[5]

It takes people a long time to realize that a revolution is underway, even when they read about it in the newspapers. Automobiles commanded a lot of attention at the turn of the century. They were a symbol of the future. The Houston Post showed the baby new year "1900" riding in on one. But they did not touch the lives of ordinary people. Many people had never seen one. An automobile was the star attraction at a fair in Emporia, Kansas in 1899. By 1900 there were approximately 8,000 in the United States, including a hundred taxies in New York City.[6] The voluminous 1908 issue of the Sears, Roebuck Catalog has 59 pages devoted to

At the turn of the 20th century, automobiles were the symbol of the future — *The Houston Post*

buggies, wagons, harness and veterinary supplies for horses, but it lists only a few small items for automobiles, including men's driving gloves, a recommended grade of oil, and a do-it-yourself handbook advertised as "A Complete Encyclopedia of the Construction, Operation and Management of Gas Engines, Gasoline Engines, Automobiles, Farm Engines and Traction Engines, Together with Complete Questions and Answers."[7] Buggy makers did not worry about the competition. When the Apple, Northstar and Radio Shack microcomputers went on sale in the late 1970s, they were more obscure than the early automobiles. Few people realized how important they would soon become.

When the last gas station in your neighborhood closes down, holdouts will be forced to buy a cold fusion car.

Not only does technology evolve into a necessity, it sometimes falls in price until it becomes virtually free. People accuse me of utopianism when I say that the cost of energy will fall to zero, but it has been falling steadily ever since Newcomen invented the steam engine in 1711. It would asymptotically approach zero even without the development of cold fusion. Even the cost of non-renewable energy has been falling, in defiance of many predictions since the beginning of the oil age. In real dollars the price of gasoline in the U.S. has declined from $1.60 per gallon in 1947 to about $1.10 today, with one short price spurt that ended abruptly in the early 1980s with the collapse of OPEC.[8] Many other goods that were expensive luxuries not long ago now cost little, including fresh vegetables in winter, pearls, automobile tires, computer memory, and ice. In northern states, people used to cut ice from frozen ponds in winter. They stored it under sawdust to be used in summer or transported south by ships, where it was a valuable commodity. In cities, icemen delivered it in blocks to housewives, who preserved food in iceboxes. Mechanical refrigeration was invented in 1834 and became practical in 1881. Ice was manufactured in large, central factories in cities, and delivered to houses with horse drawn wagons. General Electric introduced the first refrigerators for home use in 1920. They were luxury items, costing $600. (Twice as much as a Model T Ford, which was down to $290 by this time.) Ten thousand refrigerators were sold in 1920, 75,000 in 1925. Freon replaced ammonia in 1931, making refrigerators safer and cheaper. By 1937 sales reached 3 million, and the iceman was out of business.[9] The last holdout customers were forced to buy refrigerators. When the last gas station in your neighborhood closes down, holdouts will be forced to buy a cold fusion car. When the power company goes bankrupt, they will have to buy home generators.

In the summer of 1842 an enterprising merchant could send a sailing ship full of New England pond ice to Savannah, Georgia or Florida and sell it at a handsome profit. A schooner carrying ice bound for Florida was wrecked. Dr. John Gorrie needed that ice desperately, to stave off the heat in the sickroom where his wife was convalescing. He invented an ammonia ice-making machine, one of the first primitive refrigerators in the U.S. If you had told an ice merchant that in a hundred years people in Florida will make as much ice as they want with their own miniature Gorrie machines, the merchant would not have said, "someone will earn a hundred million selling all that ice!" He would understand that when that happens, the bottom will drop out of the market and ice will be worth nothing. Projecting a $300 trillion future value on cold fusion is like using the cost of 1842 pond ice to extrapolate what

New Energy Times Archive

we pay to make ice in our kitchens, with our own refrigerators.[10]

Today Exxon earns $132 billion per year selling oil. When cold fusion replaces oil, a tiny fraction of those billions of dollars may be diverted into the pockets of people who invented cold fusion, assuming they are clever enough to secure a patent. The dollars will not be earned by the companies which manufacture cold fusion machines like Toyota, Hitachi, Ford, or General Electric. Today these companies manufacture gasoline engines for automobiles and electric motors for appliances. Someday they will equip all types of machines with cold fusion engines instead, but they will not earn more profit. In the long run, competition ensures that a manufacturer can only make a moderate profit above the cost of materials and labor, and these costs will be the same (or less) than they are with today's motors. Cold fusion motors will not require particularly expensive materials, difficult manufacturing techniques, or close tolerances. Even a palladium-based cold fusion engine may not cost much. It might require roughly as much thin film palladium as you find in the catalytic converter. When cold fusion automobiles are first introduced, they will be sold at a premium. The first companies to sell them will make a windfall profit. Then competition will drive the price down, and cold fusion will become the standard. It will be an invisible item included in the base price, along with windshield wipers, electric head lights, and cabin heating. (These three were optional, extra cost features when they were first introduced.)

No Monopoly or Broad Patent Likely

I do not think that cold fusion will concentrate wealth or make one industry rich. I doubt that any one manufacturer will be able to monopolize the market for cold fusion, or dominate it the way IBM once dominated the computer business. One inventor will not patent a device that all manufacturers will be forced to license. This is unlikely for three reasons:

1. Many varieties of cold fusion have already been observed, with palladium and nickel. A patent that covers all of them would have to be very broad, which would leave it open to challenges.

2. Many different implementations will be developed. It does not seem likely that one will be so superior that it will capture the whole market. Specialized, patented forms of cold fusion may dominate certain high performance niche applications, for things like pacemakers or aerospace engines. But if an inventor tries to monopolize a larger market, like space heating or automobile engines, and he charges too much or refuses to broadly license the technology, manufacturers will circumvent the patent. They will find alternative methods that are good enough to do the job. This has been common practice since James Watt devised the sun-and-planet steam engine gear to circumvent a patent for a crank.[11]

An early personal computer. Crude devices like this will emerge in the cold fusion revolution. -- *From N. Graham, Microprocessor Programming for Computer Hobbyists, (Tab Books, 1977)*

3. The technology will change rapidly in the early years. The first machines will soon look as quaint as early airplanes and personal computers. Most patents will be obsolete before they are granted.

Cold fusion may be obsolete already. Other excess energy devices have been reported, like the Correa and Griggs machines, and various over-unity magnetic motors. Unlike cold fusion, they have not been independently replicated, so we cannot be absolutely sure they exist. If they are real then the money being poured into legal battles to patent cold fusion is a total waste. Companies spending money on these battles ought to be anxious to verify the competing claims. They belittle and ignore the claims instead, as if that will make them go away.

Increased Energy Use in Industry, not Consumer Markets

No single company or group of companies will collect the billions that Exxon now earns. With the money they save on gasoline, consumers may buy new carpets, education, or a vacation in Rio. The money Exxon no longer earns will be spread out over many different industries. For consumers, cold fusion is about saving money, not spending it. In the early stages of its development, cold fusion will benefit the consumer with lower prices more than it benefits industry with higher sales or increased profit margins. New technologies like medical CAT scans, computers, and the Internet encourage the consumer to spend money in ways he had never imagined before. Cold fusion produces energy, something we have always had. In the third world, there is a terrible shortage of energy in daily life for things like cooking, space heating, pumping water, and transportation. But in developed nations the consumer market for energy is close to saturation. It is already so cheap that people use as much as they want. People keep their houses at a comfortable temperature, turn on as many lights as they like, and drive as much as they please without worrying about the price of gasoline. Traffic congestion limits driving more than the cost of fuel.

The consumer market is saturated, but industry can always use more energy. Energy-intensive industries like air travel, aluminum smelting, and beer brewing will become more economical overnight, even before cold fusion becomes widespread, because the cost of fossil fuels will fall when people realize that cold fusion is real. This may not please the airlines and beer brewers. It may spur a price war or encourage many new companies to enter these businesses. When the cost of computer memory and other microelectronics plummeted, it did not help IBM or the minicomputer makers. New companies like Compaq sprang up and took advantage of the "commodity pricing."

Industry, trucking firms, office building and shopping mall managers will adapt cold fusion more quickly than homeowners because they have a different attitude toward capital expenditures and return on investment. They will change out capital equipment even before it pays for itself or wears out, if they determine that new equipment offers a sufficiently large return on investment. Homeowners ought to do this. They would if they understood economics. You can put $200 in the bank and earn 5% interest, or you can put it in the stock market and earn 10% if you are lucky, or you can invest it in ten compact flourescent light bulbs, which you use to replace 100-watt incandescent bulbs as they burn out. The flourescent bulbs cost more but they last 9 to 13 times longer, so you end up spending an extra $103 on equipment. They consume 75 to 80% less electricity. At 10 cents per kilowatt hour that saves $107 per year, a gigantic, risk-free return on investment. Plus, you do not have to bother changing burned out bulbs for the next seven years. As one expert put it, "this is not a free lunch; it is a lunch you are paid to eat."[12,13]

The Potential for Disruption

Cold fusion spin-off like indoor farming, desalination, and aerospace engines will

New Energy Times Archive

take decades to develop. They will require massive investment, new factories, and years of research. Cold fusion itself will take time to perfect, but the spin-offs will take longer because they are more complex, and because large scale research on them will not begin until cold fusion is commercialized. Indoor farming with robots might take 30 to 60 years to develop. It is cost effective for some crops already: flowers in the Netherlands, tomatoes in Tokyo, aquaculture in Boston. But it will be a long time, if ever, before we grow wheat more cheaply indoors than on the Great Plains. The change to automated indoor farming will occur gradually, giving displaced farm workers time to find new jobs. The energy production industries – oil, gas, coal, and the electric power companies – are another matter. The potential for chaotic disruption here is very great, because the transition will be swift and it will be in one direction only. All jobs will be lost, none will be created.

It may take twenty years to develop the first cold fusion aerospace engines, but most energy is used in simpler machines: space heaters, electric generators, and automobiles. Cold fusion will be applied to these within months of its introduction, and it will quickly sweep these markets. Fossil fuel companies will lose most of their business in the time it takes to replace the automobile fleet (4 to 8 years). I fear that cold fusion will abolish old jobs more quickly than it creates new ones. It will cause a burst of unemployment. It will not be like the unemployment in 1920s when automobiles gradually displaced passenger trains, or in the 1990s when computers finally began reducing the ranks of middle managers forty-five years after ENIAC. Automobiles and computers are so complicated, it took decades before they produced a large impact on employment. Automobiles required breakthroughs in motors, tires, quick drying paint, automatic starters, and so on. They required years of massive investment in factories and supporting technology like highways and refineries. Cold fusion will be implemented quickly by substituting cold fusion engines for gasoline engines, and leaving the rest of the vehicle alone. (Later models will be re-engineered to better exploit cold fusion's advantages.) A home generator will be a plug-in replacement for the power lines. Consumers will be ready to take advantage of it the day it goes on sale.

The change over to cold fusion will be accelerated in the last stages. It now takes 6 to 8 years to replace nearly every automobile on the road. The first cold fusion models will be expensive and unreliable, but in a few years they will become as cheap and reliable as gasoline models, and nearly every customer will select them. As gasoline automobiles wear out, more and more of the fleet on the road will be powered by cold fusion. When a quarter of the automobiles no longer consume gasoline, gas stations go bankrupt in droves. Retail gasoline profits margins are thin. In the 1970s oil crisis, consumption fell by less than 10% but this drove many stations out of business. It forced others to consolidate, and it led to almost all of them to modernize, install self-service pumps, and set up convenience stores. When consumption drops by 20, 30 and then 50% this will drive more than half of the gas stations out of business. At some point it will become difficult to find a gas station still in business. People will be stranded on highways. Commuters will have to drive miles away from their neighborhood to find one of the last remaining gas station in the city. This will force the holdouts to trade in their cars for cold fusion powered-models. Not only will it become difficult to find fuel, it will be difficult to find spare parts and mechanics qualified to repair the old models. The shift in space heaters, water heaters, stoves and electrical equipment will be accelerated for the same reason. Normally, home appliances last 20 to 25 years. But when most have been replaced by cold fusion models, you will not be able to find a repairman or spare parts for the old models. It will be like trying to fix an electric typewriter in the age of personal computers. The gas and electric utility companies will begin filing for bankruptcy, and they will stop delivery. It is not economical to run a gas or electric power distribution network when only a small scattered fractions of the houses in a city are connected.

The potential for chaotic disruption here is very great, because the transition will be swift and it will be in one direction only. All jobs will be lost, none will be created.

It must be understood that we are not talking about dislocations or a partial reduction in the number of employees in the energy business. Cold fusion will eliminate every job in every part of the energy economy. Cold fusion requires no labor, that is, no extracting or hauling fuels, opening dam sluices, monitoring pollution controls, or repairing power lines after a storm. It does require mining and metal refining, but the metals are already mined for use in gasoline engines. We may need more palladium than we use today, but this will still take millions of times less labor than we expend drilling for oil and mining coal. Nobody on earth will ever again lift a finger to fuel a machine or transmit electricity. We will have no more oil wells, coal mines or pipe lines; no oil trucks or coal trains; and no power lines, or dams. Contrary to some oil industry executives, I do not think there will be any market for oil as a chemical feedstock.[14] Enterprising companies will devise cold fusion powered machines to synthesize oil from air and water (or garbage and water). This will be cheaper, easier, and far safer than pumping oil from the ground and transporting it in ships and trucks. People who mine coal will not be mining palladium or nickel ore; the miners already digging this ore will not need much extra help. The plants at Ontario Hydro already produce more heavy water than the entire world would need with cold fusion.[15] Nobody will sell heavy water in a roadside gas station. A small amount of heavy water, perhaps a kilogram, will be permanently sealed in the motor when it is manufactured, the way acid is sealed in a battery. This will be enough to drive the car millions of miles.[16] Workers who assemble gasoline automobile engines today will do about the same amount of work assembling cold fusion engines tomorrow. They will not need help from unemployed oil company workers. This point eludes many people: with cold fusion we will build engines with same metals and other materials as we use today, with about the same amount of labor, but these engines will not require fuel. Cold fusion calls for no extra effort, and no special value added to the engine. In the larger sense, cold fusion will not cost anyone anything; no resources and no work. We must build engines anyway to replace the old ones as they wear out. We use nickel, steel and palladium in gasoline engines, and we will use them in cold fusion engines. People get the impression that cold fusion will be expensive because experimental cold fusion cells are expensive and they take a terrific amount of work to make. But so do prototype gasoline engines. Cold fusion will be about as difficult to mass produce as batteries, computer RAM chips, or catalytic converters. These are physically similar to cold fusion devices, and they require similar production techniques, cleanliness and handling.

The Energy Industry is Gigantic

The energy industry is so big and pervasive that it is difficult to find reliable figures for the amount of money it earns or the number of people it employs. Oil companies are the most important players in the energy business. Oil and gas wells together supply about 52% energy worldwide,[17] and 65% of U.S. energy.[18] Oil is impor-

New Energy Times Archive

tant because it is a military strategic necessity. It powers most vehicles and weapon systems. Oil is easy to blockade. Oil refineries are more vulnerable to attack than coal mines or hydroelectric dams. Oil deposits are not as evenly distributed around the world as coal, so oil concentrates wealth in some countries and in the southwest United States. Oil has a flamboyant history. It played a major role in both World Wars, the Iran - Iraq war, and the Gulf War. Changes in oil prices and periodic oil shocks have had a profound effect on the economy and stock markets. As Yergin says in the conclusion of his definitive history *The Prize*:

> *Oil has helped to make possible mastery over the physical world. It has given us our daily life and, literally, through agricultural chemicals and transportation, our daily bread. It has also fueled the global struggles for political and economic primacy. Much blood has been spilled in its name. The fierce and sometimes violent quest for oil and for the riches and power it conveys will surely continue so long as oil holds a central place. For ours is a century in which every facet of our civilization has been transformed by the modern and mesmerizing alchemy of petroleum.*

Information on U.S. and European oil companies is readily available, but OPEC and Russian oil companies are secretive. In 1984 OPEC appointed accountants to police quotas and maintain the cartel. "The accountants were promised access to every invoice, every account, every bill of lading. They did not get such access; in fact, they had great difficulty even in gaining entrée to some OPEC countries and were completely denied access to key facilities."[19] I asked a spokesman at the American Petroleum Institute "roughly how many people work in the industry, and what are your gross revenues?"[20] He chuckled and said the numbers are so big "nobody has a handle on that." He said overseas producers tell you only what they want you to know, and their financial numbers cannot be trusted. However, their production figures can be verified with reasonable confidence. The oil they ship to Europe and America is carefully tallied. Here are production figures in millions of barrels per day:

	July 1997	Average 1996	Average 1995
OPEC (Saudi Arabia, Iran, Kuwait, Venezuela, etc.)	**29.82**	**28.49**	**27.50**
OECD (U.S., Canada, U.K., etc.)	**18.55**	**18.37**	**18.00**
Non-OECD (former USSR, China)	**24.52**	**23.60**	**22.95**
Total	**72.89**	**70.46**	**68.45**

Data from Gulf Publications, World Oil®, www.gulfpub.com/worldoil/industry-a.html

Worldwide production increased 7% in the last two years. The average price per barrel is roughly $18. Annual production is 27 billion barrels, or $489 billion per year. The retail value of the products refined from the oil is difficult to compute. Eighty-one percent of oil is sold as fuel, the price of which varies widely from country from country. Nineteen percent is sold to make plastics, fabrics, lipstick and other synthetic products. Twenty-seven billion barrels equal 1.1 trillion gallons, or 4.3 trillion liters, so if all of the oil was sold at U.S. prices for fuel, it would be worth more than a trillion dollars including tax. This is roughly one-sixth of the U.S. GDP.

U.S. employment in the oil industry is staggering. As of July 1996, 314,000 people worked in petroleum, natural gas extraction. Ninety-nine thousand worked in refining. Pipelines, distribution, wholesale and retail sales add another 1,011,800, to give a total of 1.4 million people.[21] Compare this to:

	Employees	Annual revenue, in billions
GM	647,000	$158
Ford	371,000	$146
Chrysler	126,000	$59
IBM	240,000	$76
DEC	59,100	$15
Microsoft	20,561	$9

Data from Hoover's Company Capsules, CompuServe, Inc., and corporate annual reports

That is 1.1 million people at the big three automakers, and roughly 1.4 million at all six companies. The impact of these six going out of business in a short time is hard to imagine. This does not even take into account the demise of coal and electric power companies. It does not take into account the impact on the other companies that supply oil companies with everything from drilling equipment to health insurance. You get a sense of the total impact of the industry from this advertisement published by Mobil Corporation on the editorial page of the *New York Times* in 1995 (see next page). In 1994, the year the advertisement refers to, Mobil employed 50,400 people. As shown here, over five years it paid out $10 billion in salaries ($40,000 on average per year), and billions more in pensions, dividends, taxes, and purchases of goods and services from other companies.

On the other hand, the economy does absorb large shifts in employment. Oil industry employment has already declined considerably in recent years. Total industry employment declined by 300,000 since 1983. The 1.4 million people still working in the industry are among the best trained, most highly skilled workers in the world. As energy industries are phased out, these people must be channeled into new industries, especially large scale environmental clean up. It is unfair to say this, but they are experts in causing pollution. Oil is the largest source of air pollution. Spectacular refinery explosions and oil tanker spills are a symbol of environmental destruction. Yet the oil companies are not to blame. Oil is inherently dirty; it used to be much worse. It has improved thanks to the skill of these workers and the billions of dollars in pollution abatement equipment purchased by the oil companies. Mobil spent $3.8 billion on environmental activities. After the oil business collapses, perhaps Mobil will re-emerge as a company that sells environmental expertise to other industries. Cold fusion will eliminate about 70% of air pollution. That will leave 30% of air pollution and most water and ground pollution still to be cleaned up. I hope we can devote a large part of the money we save on energy to this task. We must re-engineer industrial plants, highways, and solid waste disposal. With cold fusion plus the technology already in hand, I believe we can reduce pollution in all categories by 95% or more.

Mobil's total revenues in 1994 were $75 billion; the advertisement refers to U.S. revenue and expenditures only. The world's largest oil company is Saudi Aramco, a member of OPEC. As noted above, financial information from OPEC companies is difficult to come by. The third largest oil company in the world is RD/Shell, a consortium of 1,600 companies, including subsidiaries and joint ventures.[22] Here are 1996 earnings from six of the top 35 oil companies. These are American or European companies, which publish reliable income statements:

Company	Rank, by production	Annual revenue, in billions
Exxon	5	$132
Mobil	7	$76
BP	10	$45
Chevron	12	$43
Amoco	13	$29
Texaco	14	$36

Rank is from World Oil Editorial, www.gulfpub.com. Revenue data from Hoover's Company Capsules, CompuServe, Inc., and corporate annual reports

The smallest of the top 35 is YPF Sociedad Anonima. It earns $5 billion per year, it has 9,000 employees, and it is the largest company in Argentina. Total revenue for the 6 listed here is $361 billion,

New Energy Times Archive

An interesting industry

When ripples make waves

Even the proverbial drop in the bucket will cause water to ripple to the bucket's edge. It's a principle that also works with money.

But that doesn't mean the money that circulates through Mobil represents just a drop in the bucket of the American economy. It's a lot more than that. After all, we're a large company, and we have a substantial impact. In the U.S. alone last year, Mobil gross revenues were over $22 billion—and more than $106 billion in the last five years.

Obviously, we don't hold on to all of that, what with our employees and shareholders and the vendors we do business with deserving their share of the wealth. So, the money moves around in what some call the "ripple effect."

And ripples do make waves.

Take us, for instance. We market our petroleum and chemical products throughout the United States, and we have facilities of one sort or another in most states in the country. Which means we help fuel the economies of a lot of different communities.

Here's a partial listing of how some of the dollars you spent at the pump, at the supermarket or in heating your homes over the past five years were fed back into your local economies.

- Nearly $10 billion was paid as salaries to our employees working in their own corners of the country from Maine to California and to federal and state governments on our employees' behalf in unemployment and Social Security taxes.
- $2.3 billion went to our retired employees as pension payments.
- $6 billion was paid out in dividends to our 194,000 individual shareholders and pension and mutual funds holding nearly 400 million shares of our common stock—95 percent of which are in the U.S.
- $15.8 billion went to federal and state governments in excise taxes and in property, production, payroll and other taxes.
- $3.8 billion was spent on environmental activities associated with our plants and operations around the country.
- $9.3 billion went for goods and services to vendors across the country, who in turn paid their employees, paid taxes and generally did all of the above. That number, by the way, does not include monies spent for crude oil and product purchases.
- And, we made some $1.2 billion in interest payments to American lenders to finance many of our projects.

Then, include the estimated $2 billion we paid in royalties to individuals and to the federal and various state governments, and it's not hard to see how the foregoing items represent a significant contribution to the nation's economy. And that's only in the U.S. The story, although not the size of the numbers, is echoed in the more than 100 countries around the world where we do business.

And keep in mind, we're just one company in this one industry.

Understandably, economics can, at times, be a daunting subject. And too often we have tended to think of it as having little impact on our daily lives.

Not so.

Every time a cash register rings in this country, it creates a ripple in the U.S. economy that eventually builds into a tidal wave of activity.

Mobil®

© 1995 Mobil Corporation

1995 Mobil ad in *New York Times* reprinted with permission from the company.

compared to $463 billion for six representative automotive and computer companies. Beyond the top 35 there are hundreds of smaller oil companies, and thousands of companies that sell drilling equipment, pipelines, gasoline delivery trucks, gas station pumps and countless other goods and services.

The collapse of oil, coal and electric power companies over 10 to 20 years could plunge whole nations into chaos. Even the rumor that they are likely to collapse could cause a major stock market crash. I believe these catastrophes can be avoided by enlightened planning, and cooperation between business and government. We must have social welfare. We must have retraining and rapid investment in new industries spawned by cold fusion. Some of the moneys you save not buying gas you will have to contribute help the unemployed, until society has adjusted to the changes. The Federal government will probably be forced to bail out defunct oil company pension funds. It bailed out railroad pension funds in 1933 for similar reasons. Automobiles reduced rail passenger traffic. The railroads could no longer support the huge base of retired employees. Government had a responsibility to help because it was building roads, which promoted the use of automobiles. Cold fusion will call for massive economic restructuring on the scale of the reunification of Germany, with the same moral imperatives. The Germans had to proceed whatever the cost—not reunifying would have been unthinkable. The nation had a moral obligation to help the former East Germans, and everyone understood that in the long run the benefits would outweigh the problems. The same can be said of cold fusion: everyone knows that people are dying for lack of energy and that pollution is a scourge. Whatever the social cost may be, not adapting cold fusion would be unthinkable.

Will the "Men in Black" Stop Cold Fusion?

Many people believe that the establishment and powerful vested interests like OPEC and Exxon will prevent the introduction of cold fusion. People say that if a cold fusion prototype engine is ever demonstrated in public, powerful organizations will conspire to send "Men in Black" to kill the inventor and suppress all knowledge of the machine. Something like this may have happened to the Farnsworth Fusor, the last invention of Philo T. Farnsworth, one of America's greatest scientists.[23] There has been unrelenting opposition to cold fusion by bureaucrats at the DoE, MITI and EPRI. The Patent Office refuses to grant patents for most cold fusion devices, citing as evidence popular press reports from 1989. Academic scientists, especially rivals in the hot fusion program, have attacked cold fusion with dirty tricks, planted newspaper stories, fake data, ridicule, and threats. They have fired scientists and barred senior scientists from the lab, forcing them to work as stock clerks. Cold fusion has been repeatedly ridiculed and attacked by leading science journals like *Nature* and *Scientific American*, and by major newspapers in the U.S., particularly the *Washington Post* and the *New York Times*. Despite all this, I do not think the establishment has held back cold fusion much, and I do not think it can stop it. Establishments are overrated. In a democratic, capitalistic society, an established corporation or government agency has little permanent power. Cold fusion has been held back mainly because of the stupidity and self-destructive behavior of the scientists who are working on it. Years ago they could have demonstrated the effect, sold prototype devices, and engaged in an effective public relations

New Energy Times Archive

campaign. Had they done so, we would have prototype cold fusion automobiles by now, and the pioneering inventors would be multimillionaires. They complain they have no funding, yet they are sitting on a commodity worth billions of dollars. A typical cold fusion inventor acts like a paranoid old miser who refuses to leave his house. He huddles protectively over a chest of gold while he starves to death. He has only himself to blame for his predicament.

The attacks on cold fusion should not be taken personally. They have no special significance. The establishment usually rejects innovation out of hand. It attacks correct ideas, incorrect ones, big ones, little ones, and many that do not seem controversial in retrospect. When someone suggested that the newly invented zipper might be used to close the fly on men's trousers, the idea was met with gales of laughter and derision. The establishment not only rejects innovation, it usually belittles and underestimates it. In 1979, I was working for a mainframe computer manufacturer. I suggested that the newly invented microprocessor might eventually hurt business. The management of the company thought the idea was ridiculous. So did the management at IBM, DEC, Data General and all of the other established computer companies. IBM was finally goaded into making a personal computer in 1980. It expected to sell 200,000 machines during the life of the product. This is the Achilles heel of the establishment: it will not take a threat seriously until it is too late. By the time the DoE and OPEC realize they are doomed, cold fusion will be unstoppable. Consumers will demand it. General Motors, Ford and Toyota will invest hundreds of millions in crash development projects to commercialize it. Cold fusion has powerful enemies, but it will have powerful friends, too.

Vested interests and established companies begin by attacking. When it becomes apparent that a new invention cannot be stopped, they switch sides and praise it. They may jump on the bandwagon and sell it, the way IBM sold personal computers. They may attack or co-opt innovation, but they cannot bring themselves to fear it. This is their second great weakness. Fear is the essential motivation in business. Long after Compaq and others began seriously hurting IBM's market share, IBM executives still belittled and ignored these upstart companies. They treated Microsoft in a condescending manner. They thought they had nothing to learn from the upstarts, and nothing to fear from them.[24]

The third great weakness of an establishment is failure of imagination. Powerful people cannot envisage a world in which the rules have changed and they stand to lose everything. Even when they are confronted with compelling evidence of grave danger, they cannot bring themselves to believe it. Sometimes they cannot even see it. They invent fantastic reasons to dismiss it. They acknowledge a trend but they imagine it will never continue long enough to hurt them. The keynote speaker in the 1908 annual meeting of the National Association of Carriage Builders said:

> *Eighty-five percent of the horse-drawn vehicle industry of the country is untouched by the automobile. In proof of the foregoing permit me to say that in 1906 - 7, and coincident with an enormous demand for automobiles, the demand for buggies reached the highest tide of its history. The man who predicts the downfall of the automobile is a fool; the man who denies its great necessity and general adoption for many uses is a bigger fool; and the man who predicts the general annihilation of the horse and his vehicle is the greatest fool of all.* [25]

Imagine you have cornered this speaker after he steps down from the dais. You ask: "Why do you say that? What will stop automobiles from replacing horses? What are the trends? Is there a fuel shortage? Are automobiles becoming more expensive?" He would not be able to give satisfactory answers. He would have no logical basis for his beliefs. History and technology were moving at a rapid pace in 1908. Electric lights, telephones, record players, the X-ray and many other inventions had recently been introduced. Belief in the benefits of progress was universal. Inventors like Edison and Bell were heros, and that autumn the Wrights would become international media stars. The speaker was ignoring history and popular culture. He was kidding himself because he did not want to face the fact that his industry was obsolete and he would soon be out of a job. The buggy manufacturers were never a threat to automobiles. Neither were the railroads, even though in the 19th century they were the most powerful industry in the country. IBM never tried to stop microcomputers. In any event, what could it have done?

Powerful people cannot envisage a world in which the rules have changed and they stand to lose everything.

A scientist once told me that even if cold fusion is real we will still need oil because "it takes oil to run the equipment to mine palladium." It did not occur to her that if automobiles will run on cold fusion, so will the digging engines in the palladium mines. Nor did she realize that takes only a tiny amount of palladium to sustain a cold fusion reaction. We are not substituting palladium ore for coal; you do not need to mine tons of palladium every year for each customer. Any scientist should know this. Top oil company executives told Hal Puthoff they would not mind losing the energy portion of their business to cold fusion because oil is worth more as feedstock than fuel. It never occurred to them that with zero cost, unlimited energy customers will synthesize petrochemicals from air and water. This will be safer and cheaper than buying natural oil. They should have realized that! These men are petroleum experts. They understand pricing, markets, customer requirements, safety, petroleum chemistry. I know little about these subjects, but the moment I considered the problem I realized that synthetic oil would have many advantages in a cold fusion economy. It is common knowledge that the Germans synthesized oil from coal on a large scale during the Second World War. I assumed that oil can be synthesized from other sources of carbon. I asked some experts and they quickly confirmed my assumption. The point is, I am nothing special. Any businessman or Wall Street stock analyst would realize this. The oil company executives have the most knowledge, they are the best placed to understand synthesis, and it would affect them more than anyone else, yet they do not see it. Perhaps they cannot bear to think of it.

The people at IBM and Data General who pooh-poohed the microcomputers were not fools. They were experts. In 1978 they knew more about every aspect of computers than beginners like Bill Gates or Steve Jobs did. The IBM people had vast experience in marketing computers. They had prestige, and millions of satisfied customers. They had billions of dollars at a time when Jobs financed his venture by selling a used Volkswagen. If they had allocated one percent of their research and marketing budgets to personal computers, they could have crushed Gates and the others. Today they would own the business. But they would have cannibalized their own mainframe and microcomputer business. They could not bring themselves to do that until it was too late. They forgot that it is better to cannibalize your own market than to let

New Energy Times Archive

the competition do it to you. If the executives at Exxon or Penzoil would look at the overwhelming experimental evidence for cold fusion, wake up, and act like rational businessmen, they would realize this is life or death. They would launch crash development projects. They would sell cold fusion motors and license the technology. They would even sell self-contained oil synthesis plants. With their expertise in petroleum refining they could shut the other chemical companies out of that business. They would put themselves out of business and stage a rebirth in a new line of work.

Established industries seldom reinvent themselves. People never seem to learn from history. Perhaps the keynote speaker at the Association of Carriage Builders was a jolly good fellow who knew nothing about internal combustion engines or high technology. But in 1925, ocean liner executives and ship captains were experts in these subjects, yet they published statements like this:[26]

> *We have long known that mechanically, the Atlantic flight is perfectly feasible. It is not any misgiving as to the machine which causes people to hold their breath when a man, or men, jumps off into the blue, with no possibility of landing under at least a thousand leagues. It is doubts as to their ability to counter those factors, any of which may entirely neutralize the perfection of the machine. Chief amongst these are the weather and the problem of human endurance. . . . [Even if these should be overcome] the simple truth is that aerial transport can never be made to pay. It can only be run on a scale of charges, which, compared with stateroom fares, is simply preposterous. There will, probably, always be a limited number of people prepared to pay these charges, just as there will always be people prepared to face the heavy irreducible risks of flying. The fundamental fact to bear in mind, in regarding the airplane as a commercial proposition is that four-fifths of her total power must always be expended in keeping her in the air, leaving only one-fifth to exert on her payable load. . . . Flying has come to stay. But I cannot believe that the airway will ever replace the seaway. We can step aboard a Cunarder at either Southampton or Liverpool, with a feeling of assurance that we shall be in New York with time-table punctuality, travelling in luxury and safety. The aircraft can never hold such assurance.*

Why shouldn't aircraft hold such assurance, eventually? Engine reliability was improving year by year. Why did this expert think that the ratio of payload to power was fixed forever, when it was improving by leaps and bounds? The comment about "human endurance" is particularly irrational. Anyone could see that airplanes would soon be large enough to carry extra crew members as well as more passengers, so pilots could work in shifts, just as sailors do. Here is the familiar pattern. The expert acknowledges that the innovation is (or soon will be) "perfectly feasible." He understands what will be needed to make the innovation practical: better engines, a bigger crew, better payload ratios. He understands the technical details. He keeps up with the latest engineering developments. Yet he cannot bring himself to draw the obvious conclusion: that he will soon face serious competition. Regular transatlantic zeppelin service began in 1928. The first Pan American Clipper flying boat transatlantic flight was in 1937.

You cannot argue with such people. The computer experts said "microcomputers are toys. They don't even have hard disks; they'll never hurt us." When I asked, "how long will it take to make a small, cheap hard disk?" they would evade the issue. Anyone who read the trade magazines could see that small hard disks were a few years away. Today the hot fusion physicists, oil company executives and government bureaucrats who oppose cold fusion are just as obtuse. Here is classic example of their thinking, in a letter from a high government official to Chris Tinsley:

Department of Trade and Industry
1 Palace Street
London SW1E 5HE

14 May 1993

Dear Mr. Tinsley

Your letter of 24 March to the Prime Minister about cold fusion has been passed to me for reply in view of my responsibility for nuclear fusion matters. I am sorry it has not been possible to reply sooner.

The DTI is aware that work continues around the world on cold fusion research and that claims of energy releases continue to be made. As indicated in your letter, if such research and development should lead to a practical operating system with useful energy releases this is likely to only be beneficial for small energy devices such as heating systems and small electricity generators.

The Government is more interested in the capability of fusion to generate power of value on a national scale and to this end it is spending considerable sums of money on fusion research. Cold fusion is unlikely to be of much value in this context. However, this Department continues to watch developments in the field of cold fusion research with interest and we welcome your input into this process.

Yours Sincerely,
J C Munday

dti - the department for enterprise

This letter contains a number of astounding errors:

There is no reason to think that cold fusion reactions must be small. Nothing in the literature and no experience with similar electrochemical catalysis or nuclear reactions would lead one to think that the size of the reaction is limited, any more than fire or fission is limited. Most cold fusion reactions are small, but for that matter so was the first sustained fission chain reaction.

Even if the size of the reaction was limited, most energy is already produced by small machines: automobile engines and space heaters. Most of the energy produced by large generators is consumed by devices small enough to hold in your hand: light bulbs and small electric motors.

The physical size of a machine that produces or consumes energy has nothing to do with its effect on the "national scale" energy flow. Light bulbs, in the aggregate, consume far more energy than blast furnaces or airplanes.

The distinction between small and large scale energy production is artificial. Producing energy on a "national scale" is like growing wheat on a national scale: it can only be done grain by grain. Energy comes from one lump of coal, or one uranium fuel rod. A certain amount of fuel is consumed nationwide. It can come from a few large generators or it can be spread out in many small machines. The best technique is defined by engineering, economics, pollution control and other factors.

Munday writes that the government is "spending considerable sums of money on fusion research." He means plasma fusion (hot fusion). He says "cold fusion is unlikely to be of much value in this context." He has no technical basis for this statement. By objective scientific and engineering standards, in 1993 cold fusion was closer to becoming a practical source of energy than hot fusion was or ever will be. Cold fusion produces far more energy than the best hot fusion experiment on record (although less power). It has a much better

New Energy Times Archive

input to output ratio. It does not produce dangerous radioactive waste. It is more reliable, and it cost millions of times less to implement.

One wonders how Munday could have become so confused. Tinsley never claimed that the energy releases from cold fusion would only be beneficial for small energy devices. He might have said that experimental cold fusion cells are small. He might have said that cold fusion will allow small, cost effective, decentralized generators. But that does not mean cold fusion is limited to such devices. Why should it be? In 1992, Pons and Fleischmann showed that a 0.5 gram palladium cathode can generate heat with the same power density as the fissioning uranium in a power plant.[27] If the reaction can be scaled up to make "heating systems and small generators" then it stands to reason that it can be scaled up again to make large generators. If it cannot be used for small generators because of technical problems or economics, it would not be feasible on a large scale either. It is an all-or-nothing situation. Either cold fusion will work for any device, on nearly any scale, or it will not work at all.

To be sure, many energy systems are only economical on a small scale, for special applications. Duracell batteries are a good choice for flashlights, but too expensive for a laptop computer or an automobile. Windmills and small hydroelectric turbines are cost effective in an isolated farm miles away from the power lines, but they are not practical in urban areas. They cannot be made compact, because power density is limited and the energy is intermittent so it must be stored. Many energy systems only work well on large scale, like uranium fission, which is limited by safety requirements. Hot fusion Tokamak reactors can only function on a large scale. Combustion is our most flexible energy source. It works for everything from vehicles and space heating to large scale power generation. Coal, oil and gas fired electric generators are more cost effective and less polluting on a large scale, but small co-generators and small generators for isolated communities are available. Every indication is that cold fusion will be as flexible as combustion. Perhaps Munday assumed that cold fusion is limited to a small scale for some technical reason, the way hot fusion is limited to a large one. He must have assumed so; nothing in the literature or Tinsley's letter would give that impression. I expect that Munday sat down and dictated a response containing whatever random thoughts popped into his head, based on fragmented impressions of cold fusion. Perhaps he is an expert on energy. In that case, he is flummoxed; he has temporarily forgotten what he is doing; his conclusions do not follow from the premises. This describes the state of mind of the ocean liner executives and the computer experts. They knew better, but they could not admit to themselves what they knew.

The Long Term: Arthur Clarke's Utopia

The demand for some products seems to expand endlessly. We can always use more computer memory, and people seem to enjoy ever-more-elaborate blockbuster movies. But what family needs more than one automobile per driver? Who could use five dishwashing machines? Who would want to travel on airplanes ten hours a day, seven days a week?

Hal Fox says that cold fusion will create ever-expanding material prosperity and employment. It will open up the planets to colonization. That will take so much work, it will create enough jobs to keep us busy for hundreds of years. This is the traditional, gung-ho American attitude reflected in "Calling All Jobs" (quoted at the introduction). It is hard to be pessimistic about the economy. As of July 1997 the stock market has been rising for years and it is at breathtaking highs. Unemployment is the lowest it has been in a generation, even though automation is more widespread than ever, computers have recently replaced millions of middle managers, and large corporations have eliminated hundreds of thousands of workers in downsizing. Since the beginning of the industrial revolution people have dreaded the effects of automation, fearing it will cause permanent widespread unemployment. It would have, if we had not reduced the work week from eighty hours to forty. Most innovations take a long time to develop, giving society time to adjust to them by reducing the work week or inventing new industries. From time to time a new invention that is easy to implement has spread swiftly, causing a burst of unemployment. A famous example is the spinning jenny, which led to the revolt of the Luddites and the speech by Lord Byron quoted above.

In spite of the booming economy and low unemployment, there remains an undercurrent of fear. Unemployment numbers mask deep social problems: they do not count people who have given up are no longer looking for a job. We have a large underclass of permanently unemployed people. The gap between the rich and the poor is the largest it has been since the Great Depression. Top management and skilled experts earn far more than ordinary workers. Federal Reserve chairman Alan Greenspan says this could become a "major threat" to the economy.[28] Perhaps these problems are caused by greed or cruel social policies, but automation also plays a role. We need experts to design robotic machines. We do not need factory workers to operate them; they operate themselves. It is astounding how few people it takes to run a modern factory. The supertanker that ran aground in Tokyo Bay on July 2, 1997 had a crew of only 25. AT&T and MCI have replaced their long distance collect call operators with voice response computers. Jobs have been "dumbed down." It takes little skill to operate a supermarket checkout line compared to a push-button cash register, so clerks cannot demand higher wages. Customers do their own work, operating machines themselves. One supermarket recently began letting customers scan their own goods, with one clerk to keep an eye on four checkout lines. Gas station attendants have been replaced with self service pumps. People even do semiskilled work like computer typesetting on their own machines. A front page article in the Wall Street Journal is titled "A Slide in Factory Jobs: The Pain of Progress."[29] It quotes Lester Thurow at MIT, ". . . for the bottom 60% of the work force, real income is going down. Something bad is going on in our lives." A *New York Times* [30] article, "Do Computers Eat Our Paychecks?" says:

> *Computers have enriched a small class of technological wizards and management consultants who streamline production, merging and "downsizing" and "re-engineering" the companies of America to the great benefit of managements and stockholders. But those same computers have eliminated many jobs and significantly reduced the skills needed in the jobs that survive, thereby weakening the bargaining power and income of most wage earners.*

Cold fusion will cause dislocations far greater than these

Chris Tinsley believes that the coming unemployment problem will be solved by the expansion of other jobs. We need people to educate the children, take care of lonely old people, and clean up the environment, and to do jobs which might seem frivolous until we can afford to have people doing those jobs. Many of the growth industries of today would be regarded as a joke by past generations; people get paid to sell things on cable television that nobody really wants. He points to the example of agriculture in Britain. Before the industrial revolution nearly everyone worked in agriculture, yet food production was barely enough to sustain the population. The population exploded in the 19th

New Energy Times Archive

century, and became dependent on imports. By the 1930s the proportion of the population working in agriculture was much lower, efficiency was up, but some food was still imported. Today, the population is higher than ever, a mere 1% of the population works in agriculture, but Britain is a net exporter of food. This gradual transition has not caused permanent massive unemployment. It has not concentrated power or great wealth in the ranks of the few remaining farmers. Furthermore, in the 1970s and '80s large British industrial corporations relentlessly automated and shed workers, leading to an implosion of manufacturing jobs even more severe than the rest of the industrialized world, yet unemployment remains lower than most European nations. Today, hardly anyone seems to work for the (formerly) large corporations. Self-employment, home-offices and cyber-commuting are booming. People start their own companies providing innovative (and often apparently pointless) new services, from home design to frivolous travel and entertainment. Tinsley feels that as long as money and prosperity surge through society, people will find clever ways to snag it for themselves.

Fox and Tinsley may be right about the short term, but I think that computers and cold fusion are the harbingers of a new era in economics. Communism has fallen; capitalism may be next. We are seeing the beginning of the end of work itself. For two hundred years the economy has been growing as we consume more and more goods and services. We assume that consumer demand has no limits. People will always want more goods, more appliances, more radios, automobiles, dishes. But this cannot be true. As my mother used to say, "no trend lasts forever, or the world would be knee deep in televisions." The famous 1949 exponential jump in television sales had to slow down eventually. You cannot watch fifty television sets. There is a limit to how much we want to consume, and how much we are physically able to consume. Most people have no place to park to a dozen automobiles in front their house, or dig five Olympic swimming pools. You cannot eat thirty gourmet meals a day. People in the third world are nowhere near the limits, but in the developed world it is difficult to imagine that our per capita consumption can increase by a factor of 10 or 100, or 1000. A prizefighter in Atlanta recently built himself a giant mansion. It sits in isolated splendor with a theater, a bowling alley, room for dozens of automobiles, giant closets bulging with clothes, and on and on. I suppose some people envy the fellow and would like to live that way, but I would find it a nightmare. Cold fusion powered food factories may double our available land by eliminating outdoor agriculture. Cold fusion may ultimately allow us to move our factories to the moon,freeing up even more land. We might build mansions, or shopping malls, or sprawling private parking lots to store our collections of Rolls Royces. I hope that most people have more sense and better taste. I hope that most of the freed up land can be returned to nature.

I think that computers and cold fusion are the harbingers of a new era in economics. Communism has fallen; capitalism may be next. We are seeing the beginning of the end of work itself

There are limits to how much travel and entertainment we can consume. Entertainment can automate itself into bankruptcy as readily as any other business. Classical music recording fidelity has grown so good that old recordings last forever. They sound as good as the new ones, so catalogs offer 40 versions of the Chopin preludes, 100 recordings of Vivaldi's "Four Seasons", and 25 of Mahler's Sixth Symphony.[31] Up-and-coming classical musicians cannot find work, because they cannot compete with famous dead musicians. Today, home renovation calls for a licensed architect who makes a good living. Someday one architect will do the work of many, using a computer program that generates detailed floor plans certified to conform to the building codes. The architect will sit down with the customer to design a new house or renovation. He will bat out a finished floor plan an hour later, and 20 other architects will be unemployed. I do not think the demand for home renovation will increase by a factor of 20. High technology seems labor intensive and highly rewarding. Politicians love to think so. But it has a nasty habit of imploding, or killing itself off. It has always been this way. In an earlier article I mentioned that the chronometer makers perfected their art so well between 1800 and 1920 that they put themselves out of business.[32] With proper maintenance their instruments lasted for decades, being passed from one ship to another. By the early 1900s there was only one manufacturing firm left, which was enough to keep up with demand for new clocks and replacements.

No trend lasts forever; the end of automation will be reached when nearly every job is eliminated. Computers and robots will do everything from paving roads to building houses and flying airplanes, setting the table, setting broken bones, and operating on your appendix. It may take hundreds of years for computers to develop the intelligence to do these jobs. They may never be able to perform critical tasks without guidance by human experts. But airplanes already fly on autopilot. Computer controlled lasers already perform delicate eye surgery. They will go much farther, even in our lifetimes.

Suppose we were invaded by a hoard of super intelligent robots anxious to do our bidding and fulfill every wish, and work disappeared overnight. Most people would not know what to do with themselves. People identify with their job, and define their self worth by it. That is part of the work ethic, which has been essential to human survival throughout history. Ask a man "what are you," and he replies that he is a carpenter or an accountant. Losing a job is a traumatic experience for most people, even in European countries with extensive long-term unemployment benefits. When people are incapacitated by illness or accident, and find themselves unable to work, they are often devastated by the loss of social status, the loneliness, the lack of structure and purpose. This happens to rich people who retire with no loss in income. It even happens to people who win millions in the lottery and quit their jobs. So what will it be like on that distant day when all labor is automated? Money will lose most of its meaning. For many people life may lose its purpose.

The Mobil Corporation advertisement is right on target. The economic benefits from drilling, shipping, refining and selling oil help everyone in our society. The pollution and the flow of money into the Middle East hurt everyone, too. Careers and daily labor give people dignity. The people at Mobil have a right to be proud of their labor. It is difficult work. It is vital. We would starve without these people. Their labor serves higher social purposes, just as they say. It spreads wealth, pays for pension funds, provides security. Mobil is not just selling oil, it is selling a vision of society happy, prosperous, and hard at work. Unfortunately for Mobil, with cold fusion we will have no use for any of that stuff. The customer wants a tankful of gas. He does not give a hoot about economic stability or pension funds. When cold fusion comes, he will stop paying for gas and not think twice about pension funds. Nobody will pay the people at Mobil to do useless labor with obsolete tools. That would be like paying them to cut wood with a handsaw. Even a demeaning, low-paying job collect-

New Energy Times Archive

ing garbage or cleaning toilets can give a person a sense of self respect. But the moment any job is automated, it is no longer fit for human beings. It becomes worse than slavery. There is no dignity in a man doing something a machine can do faster and better at a fraction of the cost. There is no meaning in it. It is like fighting a war after your side surrenders.

When all work is automated, we will have to learn to find our purpose in life elsewhere. Work is already fading in importance. Money is not as important as it once was. People no longer starve when they are penniless. In developed countries, everyone has access to clean water, primary education, and public libraries. In every developed country except the United States, free health care is considered the birthright of every citizen. This does not demoralize people, or rob them of their sense of purpose. Someday, unlimited food, housing, education, health care, travel, books, television and Internet access will be the birthright of every person on earth. Arthur C. Clarke described how we might live when this comes about, if we are wise enough to build a society worthy of our technology. He describes a replicator, the ultimate labor saving machine:[33]

> *It is certainly fortunate that the replicator, if it can ever be built at all, lies far in the future, at the end of many social revolutions. Confronted by it, our own culture would collapse speedily into sybaritic hedonism, followed immediately by the boredom of absolute satiety. Some cynics may doubt if any society of human beings could adjust itself to unlimited abundance and the lifting of the curse of Adam – a curse which may be a blessing in disguise.*
>
> *Yet in every age, a few men have known such freedom, and not all of them have been corrupted by it. Indeed, I would define a civilized man as one who can be happily occupied for a lifetime even if he has no need to work for a living. This means that the greatest problem of the future is civilizing the human race; but we know that already.*

Footnotes

1. C. Cerf, *The Experts Speak*, (Pantheon Books, 1994), p. 91.
2. C. Cerf, ibid., p. 211.
3. Microsoft Bookshelf CD, *The People's Chronology*, (Henry Holt and Company, 1992).
4. My only source for this is my mother's recollection of an undergraduate course in economics course at Cornell University in 1939. The professor's main thesis, which he frequently repeated during the semester, was that the changeover from horses to automobiles had caused massive unemployment. He thought this was the main cause of the Great Depression.
5. F. L. Allen, *The Big Change 1900 - 1950*, (Harper and Row, 1952), Chapter 8, "The Automobile Revolution."
6. W. Lord, *The Good Years*, (Harper and Bros., 1960), p. 4. Similar examples cited in many popular history books. See F. L. Lewis, ibid., p. 7
7. Sears, Roebuck & Co., *1908 Catalogue No. 117*, 1180 pages, reprinted by Follet Publishing Co., 1969, p. 88. Two marine gasoline engines are shown on page 553, including a 10 hp unit for $318.
8. D. Yergin, *The Prize*, (Simon and Schuster, 1991), p. 786.
9. Microsoft Bookshelf CD, *The People's Chronology*, (Henry Holt and Company, 1992).
10. We pay about 5 cents per kilogram for ice. The heat of fusion of water is 80 calories per gram, so it takes 0.09 kilowatt hours to freeze the water. I assume refrigerators are about 20% efficient and electricity cost 10 cents per kilowatt hour.
11. D. Cardwell, *Norton History of Technology*, (Norton, 1995), p. 163.
12. A. P. Fickette et al., "Efficient Use of Electricity," *Scientific American*, September 1990, p. 67
13. Data from Fickette, ibid., and also Philips Lighting Company, Earthlight® package for a 25 watt bulb, equivalent in luminosity to a 100 watt incandescent. Philips claims the bulbs last 10,000 hours, or 7 years with 3-4 hours average daily use. Energy consumption per year, per bulb is 35.7 KWH versus 142.8 KWH. A business also saves money on the labor required to change 13 burned out bulbs, which leads Fickette to conclude that equipment and labor costs alone justify the use of compact flourescent bulbs, before you even factor in the money saved on energy.
14. "Cold Fusion and the Future, Part I," *Infinite Energy*, Issue #12, p. 12.
15. Ontario Hydro uses the heavy water as a moderator in their Candu fission reactors, an application that calls for hundreds of thousands of tons a year. In a palladium cold fusion economy the heavy water itself would react, and only ~24,000 tons would be needed worldwide.
16. In "Cold Fusion and the Future, Part I," p. 11, I estimated that a kilogram of heavy water produces as much energy as 2.9 million kilograms of oil, or roughly a million gallons. Assuming that the Carnot efficiency of a cold fusion heat engines will be as bad as a gasoline powered engine, this would be enough to drive 20 million miles in the city. Actually, Carnot efficiency will probably be much better; see Part 1, p. 10.
17. G. Davis, "Energy for Planet Earth," *Scientific American*, September 1990.
18. American Petroleum Institute, Frequently Asked Questions, http:// www.api.org/webfaq.htm
19. Yergin, p. 746.
20. American Petroleum Institute, 202-682-8000, www.api.org
21. Statistics from the API Basic Petroleum Data Book, Section V, Table 2, courtesy American Petroleum Institute. I did not include the 29,600 people employed in the Paving and Roofing industry, because I assume these jobs will continue even after the demise of the oil industry. I assume that in 20 years roads will be paved with synthetic oil produced with cold fusion energy. Approximately 20% of the people working in refining may also be employed, unless the synthetic oil generating machines are fully automatic.
22. www.shell.com
23. G.Vassilatos, "The Farnsworth Fusor: the Most Notably Forgotten Episode in 'Hot ' Fusion History," unpublished manuscript.
24. R. Cringely, *Accidental Empires*, (HarperCollins, 1993)
25. D. Sanders, *Computers in Business*, (McGraw-Hill, 1968), p. 64.
26. J. Brinnin, *The Sway of the Grand Saloon, A Social History of the North Atlantic*, (Delacorte Press, 1971), p. 460.
27. M. Fleischmann (Univ. Southampton), S. Pons (IMRA Europe), "Calorimetry of the Pd-D_2O system: from simplicity via complications to simplicity," *Physics Letters A*, 176 (1993) 118-129.
28. M. Frankel, "Do Computers Eat Our Paychecks?" *New York Times Magazine*, March 10, 1996.
29. J. M. Schlesinger, "A Slide in Factory Jobs: The Pain of Progress," *Wall Street Journal*, April 28, 1996.
30. M. Frankel, ibid.
31. T. Page, "A Sour Note. With a few exceptions, the future for classical recordings looks bleak," *The Washington Post*, June 24, 1996
32. Landes, p. 186, describing the argument of A. C. Davies, "The Life and Death of a Scientific Instrument: The Marine Chronometer, 1770-1920," *Annals of Science* 35 (1978) pp. 509-525
33. A. C. Clarke, *Profiles of the Future*, (Bantam, 1972), chapter 13, "Aladdin's Lamp"

"Free Energy" Excerpts —Continued from page 32

was, for doing that kind of measurement and showing it in the physics literature. So we know it's real, experimentally it's detected. The Casimir Shift for example shows clearly that it's there and it does generate energetic effects in your actual materials. It turns out that in the modern view, the modern quantum mechanical view, if you apply that knowledge that's been gained there what you find is that the vacuum is fiercely active, it's a fierce energy flux and going at all directions at all times. The energy density of that as estimated by various physicists is extremely high. For example in one cubic centimeter, if you could take the raw energy in that cubic centimeter and condense it into mass divided by C squared, you would have more observable mass result from that than our largest telescope can see in the observable universe in all the stars and planets today. And so the energy that's there is extremely dense and extremely fierce. This drives everything that we call physical reality, from the quantum level right on up to the observed level and the observed world that we live in. Everything is energetically driven by the vacuum.

TOM BEARDEN:
And so most of the scientists equated any notion of a free energy or overunity device as being a perpetual motion machine and therefore utter nonsense. You see, it's a play on words. The scientists interpreted it one way, the guys trying to do it are looking at it as an open system. Now, fortunately today we have the type of thermodynamics, you know, Nobel prizes have been issued for it, to Prigogine for example, for systems not in thermodynamic equilibrium, that do have, they're open systems and the energy does flow in from outside and through them. Those kinds of systems can produce overunity. It's all perfectly legitimate physics.

MORAY KING:
Today, most scientists aren't aware of the literature that the zero-point energy even exists. Mainly, 'cause most scientists aren't physicists. Now, I went to school,

Continued on page 69

New Energy Times Archive

Fourth International Symposium on New Energy

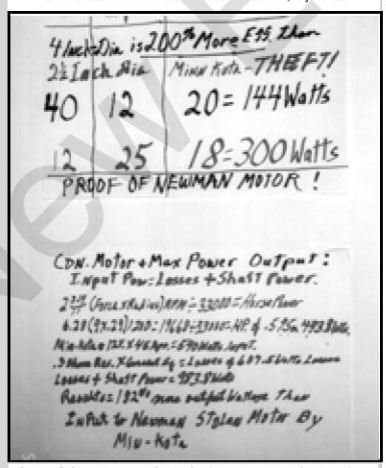
Denver, Colorado — May 23-26, 1997

Joseph Maize, President of the ANE (Academy of New Energy), addressed the 4th ISNE

Dr. Carol Talcott Storms, Dr. Edmond Storms, and Dr. Joseph McKibben—a virtual LANL contingent!

Tom Bearden— a world class speaker and E-M and over-unity theorist

Paul Pantone— A man of action from Price, Utah! Here he demonstrates his *new* line of GEET-technology retrofit Coleman ICE/generators. They *cleanly* burn (ultra-pure exhaust) all manner of liquids mixed with gasoline or diesel fuel. He claims very large increases in running time for the same electrical load—compared to a non-GEET-equipped unit. These can be checked out easily now—he is selling fully assembled 10-HP units for $1,350.



Joe Newman's claims on chart he presented.

David Wallman of DW-Research, discussed how underwater arc-generated carbo-hydrogen gas could be commercialized

The ANE awarded Drs. Pons and Fleischmann *separate* plaques that read:

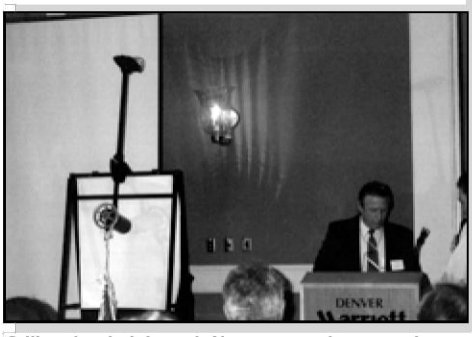
This Award Respectfully Honors the Pioneering Experiments Performed by Dr. Stanley Pons

---

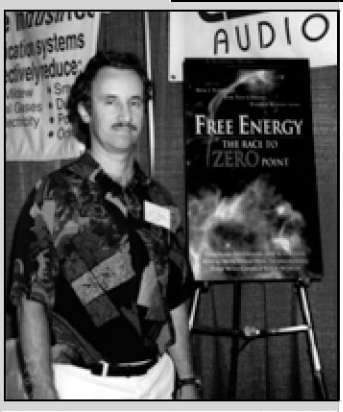
Dr. Martin Fleischmann In Electrolytic Cold Fusion And Gratefully Acknowledges the Personal Sacrifices Made In Bringing This Magnificent Discovery to the Attention of the World

Dr. Edmond Storms was dinner speaker on Cold Fusion.

Chip Ransford of NOVA Resources Group (NRG) in Denver, explains his modularized technology— a brilliant game plan for taking over the power industry with cold fusion reactors.



Still embattled Joseph Newman made a passionate presentation, accusing former colleagues of being "traitors" and helping a US-based corporation to "steal" his technology. He cited as an example, the Min-Kota electric boat fishing motor—widely available, which he said clearly uses his designs and exhibits over-unity. He used constant torque via a weight on a pully (replacing the propeller), plus V-I power measurements to make his case. Some may have been persuaded, but the motor did not appear to produce more torque power than input power, according to some assessments. Newman suggests that the heat-losses in the motor, plus the output mechanical power make the motor over-unity.



Chris Toussaint, the man behind the wonderful, tour-de-force FREE ENERGY: The Race to Zero Point video tape- tapes were selling fast at the Symposium (see transcript excerpts, page 32)

Photos: by Gene Mallove

New Energy Times Archive

VIDEO TAPES of *Third International Symposium on New Energy* are now available through Cold Fusion Technology

- Choose the tapes you want from the list below
- Please order by Number, Name, and Topic
- Enclose payment:

  Price *per tape*: US $20.00
  Add first class shipping charges within the U.S.: $4.00 for first tape, plus $1.00 per each additional tape. (Foreign air mail shipping can be billed to your credit card.)

SEND Payment to: Cold Fusion Technology, P.O. Box 2816, Concord, NH 03302-2816 FAX: 603-224-5975

******Please allow three weeks for delivery******

TAPE #	SPEAKER	LECTURE TITLE
1-AA	HAL FOX.....	COLD FUSION: THREE NEW TYPES OF ENERGY
2-AA	RON KOVAC.....	PLASMA SHAPING: NEW MASS & ENERGY SOURCE
3-AA	DENNIS CRAVENS.....	PATTERSON FUEL CELL
4-AA	TOM VALONE.....	FREE ENERGY & PROPULSION
5-AA	JAMES GRIGGS.....	THE HYDROSONIC PUMP
6-AA	EUGENE MALLOVE.....	COLD FUSION & NEW ENERGY
1-BB	HAROLD ASPDEN.....	VACUUM SPIN AS NEW ENERGY SOURCE
2-BB	PAUL PATONE.....	G.E.E.T. DEVICE
3-BB	MORAY KING.....	THE SUPER TUBE
4-BB	ROBERT GOLKA.....	BALL LIGHTNING
5-BB	R.M. SANTILLI.....	HADRONIC ENERGY:NEW SUBNUCLEAR SOURCE
6-BB	JOHN EARLE.....	WINDMILL ENERGY
7-BB	A. MICHROWSKI.....	BROWN'S GAS /ENERGY AUTONOMOUS HOMES
9-BB	BRIAN O'LEARY.....	FREE ENERGY, 0 POINT, & CONSCIOUSNESS
10-BB	YOST/HULL.....	TESLA COILS,ELECTROSTATICS, & ELECTRIC PROPULSION
13-BB	JOSEF GRUBER.....	ECONOMIC EFFECTS OF SPACE ENERGY TECHNOLOGY
14-BB	GLEN REIN.....	ANOMALOUS INFO. STORAGE IN WATER
15-BB	LARRY DEAVENPORT...	TOWARDS FLIGHT WITHOUT STRESS,STRAIN, OR WEIGHT
16-BB	TOM BEARDEN.....	REGAUGING AND MULTIVALUED POTENTIALS
17-BB	MIKE FISHER.....	HOW TO MARKET YOUR ADVANCED TECHNOLOGY
18-BB	A & P CORREA.....	PULSED ABNORMAL GLOW DISCHARGE REACTOR
19-BB	DALE POND.....	THE KEELY MUSICAL DYNASPHERE
21-BB	ROBERT EMMERICH....	ON ENERGY MEASUREMENT
24-BB	MARTIN BURGER.....	TIDAL POWER
25-BB	JEANE MANNING.....	THE COMING ENERGY REVOLUTION
26-BB	GEORGE WISEMAN.....	SOLID STATE ENERGY
27-BB	GERALD ORLOWSKI.....	50 HP FREE ENERGY UNIT
1-WS	DALE POND.....	WORKSHOP
2-WS	A. MICHROWSKI.....	WORKSHOP
3-WS	PAUL PANTONE.....	WORKSHOP - GEET DEVICE
4-WS	EUGENE MALLOVE	WORKSHOP - COLD FUSION / NEW ENERGY
5-WS	BRIAN O'LEARY	WORKSHOP
9-WS	DENNIS CRAVENS.....	WORKSHOP- PATTERSON CELL
11-WS	TOM VALONE.....	WORKSHOP

ORDER YOUR ISNE3 VIDEOTAPES TODAY!

COLD FUSION TIMES

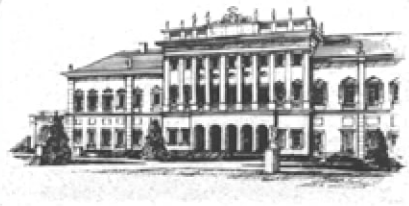
The Journal of the Scientific Aspects of Loading Isotopic Fuels Into Materials

Published Quarterly

Publisher and Editor
Dr. Mitchell Swartz

Annual subscription rate is $120.00. Single issues are $40.00. There is an extra postage and handling charge of $5.00 per order outside of the United States.

P.O. Box 81135
Wellesley Hills, MA USA
02181



Exclusive Video Tape Coverage of the.....

Second Annual Conference On Cold Fusion—ICCF2
Held at the Centro Di Cultura Scientfica "Alessandro Volta"
Villa Olmo, Como, Italy —
—June 29 - July 4,1991

Two VHS Tape Set, Four Hours, NTSC Format

To order your set of ICCF2 Tapes, send check or money order for $165.00 (U.S. and Canada) or $185 (for other foreign) (in US funds) to:

Cold Fusion Technology
P.O. Box 2816
Concord, NH 03302-2816
Or, provide credit card information—number and expiration date—
(Master Card, VISA, AMEX)
FAX: 603-224-5975

New Energy Times Archive

An Update on the Continuing Research into T.H. Moray and Other Free Energy Devices, With Conclusions

by John W. Moreland, Ph. D.
AZTEC PUBLISHING, 1251 SMITH THOMPSON ROAD
BETHPAGE, TN 37022-9110
PHONE 615-888-3428 FAX 618-888-2538 INTERNET http://www. aztecpub.com

A very important speech, delivered by Dr. John W. Moreland at the 4th International New Energy Symposium, Denver, Colorado, May 23-26, 1997. If Dr. Moreland (and Dr. Paul Brown) are correct in their assessments of the T.H. Moray developments, the era of "free energy" should well have begun long before 1950, not in the late 1980's and early 21st Century.—EFM

ABSTRACT

At the Tesla Symposium last year, I gave a report on my research into the T. H. Moray Radiant Energy Receiver, in a combined speech with Bruce Perreault. Over the past year both Bruce and I have continued our research. Bruce has stayed mostly with the T. H. Moray research, while I have not only continued my research into T. H. Moray but have also branched out to other free energy devices because of the facts I have uncovered in my various researches.

I have researched all of the relevant books, periodicals and other references that I could find from 1880 to the present. Some of the books that I have found to be of the greatest help were the books by Gustave LeBon, Rutherford, Curie, and of course T. H. Moray. There are many other books I also found valuable but the list is too great to go into here. You can check my web site for more information on these books. Most of these were so hard to find that I decided to start a publishing company to reproduce these books and many more, including new books by Dr. Paul Brown, Bruce Perreault, Rodney Sego, and several others currently researching free energy. Both Dr. Paul Brown and Rodney Sego have just written new books on their researches into T. H. Moray and both of these books just became available as of May 15,1997.

One of the things I have found that seems to be constant with all of the free energy devices that I have researched is radioactive materials. These devices include not only the devices of T. H. Moray, but also those of Hubbard, Hendershot , and Testitaka. Even the increased power of the new neodymium and samarium /cobalt magnets can be traced to radioactive materials. Radioactive materials appears to be one of the keys to free energy.

I will attempt to cover all of these devices in a logical manner. Because of the time allocation here today I will have to cover some of the items rather quickly. I will be giving a more thorough coverage of each of today's items and a lot more subjects in the book I am presently finishing. I hope to have it completed later this year. Also I will have copies of this speech complete with all of the overheads available at my booth for anyone who wants them. My booth is in the main exhibit area and all profits from the sale of books I offer will be used to further my research.

Before getting into each individual device I would like to pass on a few general observations and conclusions that I have reached as a result of my years of research into the alternate energy and free energy fields. It would appear that the time span between 1900 and the late 1930's was a very prolific period, with a lot of people trying to develop power sources using the newly found radioactive materials such as Uranium, Thorium and Radium. These include Perrigo who invented his first unit 1915 and who by 1922 had demonstrated a unit which produced 4,500 watts. He died shortly thereafter taking the secret to the grave with him. Another is T. H. Moray who produced his first unit in 1910, producing 8 watts, and by 1925 had a unit producing 650 watts. Moray went on to produce a unit in the late 1940's that produced 3,000 watts. Next was Alfred Hubbard who built his first unit in 1919, producing less than 100 watts, and by 1926 had demonstrated a unit producing 26,000 watts. He sold all rights shortly after that and disappeared—again the technology was not developed. Last was Lester J. Hendershot who invented his first unit in 1928, producing less than 100 watts, and had a unit producing 300 to 500 watts in the late 1930's, and a final unit producing about 1,000 watts around 1950. Hendershot's son Mark is presently working to reproduce the device.

If I had had to rely on modern textbooks a lot of the data presented here today would not have been possible to find. It was only after studying the works of the great researchers of that era like Rutherford, Chadwick, Lind, Geiger, Crowther and especially Le Bonn's books that I had a good insight into the awesome amount of knowledge that was discovered during that period in history. After searching out these books, some of which were almost impossible to find, I can clearly see why so much research on free energy was done during the time from 1900 to 1940. Also, during that period radioactive materials were easy to get because the government did not have the strict regulations it has today. At that time, anyone could go to the hardware store and buy Radium paint to make their light switches, and any thing else, glow in the dark so they could find them easily. With all of this information and the materials needed so readily available there were a lot of people conducting research. I urge every serious free energy researcher here to thoroughly study the books of this era. The amount of information in them is truly awesome. If anyone wants a list of these books, please come by my booth and I will give you a copy of the list.

I would like to start with the T. H. Moray device. This is what I call "the Holy Grail" of free energy research and is the device that I have devoted more research time to than any other. It is the device which has gotten more coverage than all of the other devices combined, even though there were other devices more powerful and were invented ahead of Moray. I will not be giving a boring history lesson on the already known facts of this device, which have been beaten to death over and over in many books and by many speakers over the years. I will attempt to give only new information, some of which has never been divulged in public before today. I will attempt to cover as little of the well-known history as possible, using only those items that are necessary for a more complete understanding of the new information I am going to provide.

Before I get too involved in the construction details of the Moray devices I feel that there needs to be some clarification on the various publications put out over the years by the Moray family. I will take these in reverse order, the reason for which will become apparent shortly.

The most recent publication was *The Sea of Energy in Which the Earth Floats*, fifth edition. This was published in 1978 by

New Energy Times Archive

John Moray, T. H. Moray's son.

Here you see the fourth edition of *The Sea of Energy in Which the Earth Floats*. This was published in 1960.

A book called *Radiant Energy— For Beyond the Light Rays Lie the Secrets of the Universe* was published in 1945 and 1956.

Before 1945, Moray had several printings of a small pamphlet called *Beyond the Light Rays*, which was first published in 1931.

The 1931 publication was the first edition and the 1945 and 1956 books were the second and third editions respectfully; the fourth and fifth editions were as labeled. This is confusing because one does not normally change the title of the book from one edition to the next. But then, anyone who has known either the father or the son will tell you that "strange" is only the beginning. All of these editions are good reading. However, most experts in the field agree that the fourth edition is the best. The fourth edition was the last one to be written by T. H. Moray himself. The fifth edition is an edited version of the fourth edition with some things not the same as in the fourth edition. The only new information that I have been able to find in the fifth edition is page after page of testimonials and hype on how the Morays need financial help to finish T. H. Moray's work. I did find a couple of things useful in the fifth edition, however I will get into these later.

In my research I found that Moray only built a total of four devices. The first appears to have been built around 1910. This unit produced about 8 watts. Of course, you must remember that in those days the FCC did not exist and radio stations were few and far between. These stations could pump out as much wattage as they wanted to. Many stations put out so much wattage that it was dangerous to be too close physically to the transmitting tower! With this in mind, it is not hard to see how Moray could get 8 watts out of an antenna that was 70 feet high and over 100 feet long, receiving a signal from a powerful radio station only a few miles away. In 1912 he went to Sweden and returned in 1913. While in Sweden he supposedly found his "Swedish stone" that allowed him to draw more power than before. Later in this talk I will give you my thoughts on exactly what I think the stone was and where I think it came from. Using this stone in the early 1920's, he built the first generation unit which produced about 25 watts using a modified crystal radio with the output going to a light bulb instead of a speaker.

He kept on refining this unit until by 1925 he could produce 100 watts. This was the second generation unit.

Here you see the third generation unit, which is again nothing more than a modified crystal radio which is now hidden inside a wooden box. He kept improving this same unit until it could produce about 650 watts for short periods of time. This 650 watt unit is the unit on which all of the testing by Harvey Fletcher and many others was done. This is the <u>only</u> unit that was ever tested for long periods of time. This unit and the fourth unit were only run for short periods of time, usually only a few minutes, and never for over an hour at a time with more than about a 200 watt load. The fourth unit could produce a lot more power but it had the same limitation of overheating on long runs at full power output. Again, this unit could be run for long periods of time, but only with reduced loads of less than 200 watts to keep the unit from overheating and burning up the "Swedish Stone."

Let us now take a closer look at this second generation unit and see how it was constructed. This is a picture of this unit. As you can see its construction was typical of crystal radio receiving units of that period. In order to understand how it was constructed, I went back to the crystal radio construction books of that time. The best information I found were these three publications from the Bureau of Standards.

The first is a book, *The Principles Underlying Radio Communications*. Although it is called pamphlet #40, it is over 600 pages of some of the finest radio principles and radio set constructions plans of that era. It was first published in 1918 and this second edition in 1922. This was the bible of radio construction of that era and would definitely have been used by Moray in the construction of all 4 of his devices.

These two circulars, also from the Bureau of Standards, numbers 120 and 121, which show the detailed step-by-step construction and operation of a radio receiver of that era.

As you can see, the layout and components are almost identical with the layout in our picture of the Moray device. We have the two coupling coils and the tuning coil that we saw in the picture of the earlier unit.

Now let us see what else we can figure out about the items in this picture. There are two items that stick out rather quickly as not being standard for that era— or are trying to be hidden from identification. They are here and here. The first item appears to a Pickard detector.

These are just four of the Pickard patents, the first is 1906, the second is 1908, the third is also 1908, and the fourth is 1909. These detectors use various combinations of zincite (known as zinc oxide or triboluminescent zinc), chalcopyrite (a form of iron pyrite or iron sulfide), silicon (which is of the same family as germanium), and bismuth metal. Does any or all of this sound familiar? It should, these are all of the same components as in the Moray detector patent application. Could these patents be part of the reason Moray could not get a patent on his detector when he applied for it more than twenty years latter?

This shows the patent application date July 13, 1931 as shown on pages 129 through 133 of the fourth edition. I have searched the patent records as well as I could, but I cannot find a record of Moray's application. There probably was a patent application in 1931, however it is my opinion that it was for his earlier unit, which used the Pickard type of detector and was denied because of Pickard's patents. It is sad that we may never know the real story and exact time-line here, because of John Moray's obstinacy in releasing any information on his father's work. With as many people researching his father's work as there are today, the story will eventually be pieced together. The sad part is that there is a good chance that a second Moray will take the complete story to the grave. It is my hope that John Moray will see the light and release all of his father's work before he dies, however having talked with him and met with him on several occasions over the past few years, I will have to say that this idea has about as much chance as a snowball in Hades. Perhaps if enough people contacted him we could change his mind.

One of the few things I found of value in the fifth edition was a passage that leads us to the next stage of the development of the Moray devices. I quote from page 186 of the fifth edition, "In 1942, shortly after World War II began for the United States, Henry Moray attempted to rebuild a Radiant Energy Device using the remaining bit of what was known as the 'Swedish Stone.' This material, which was the heart of his original RE detector, he had never been able to duplicate, and the shortage of this material limited the amount of power he could draw. Consequently, in the larger unit, he developed a second detector that forced him into extensive research involving nuclear materials and radioactive reactions."

From this we see that Moray had used up most of the "Swedish Stone" he had brought back from Sweden. Actually, he did not use it up, he burned it up. Every time he tried to draw large amounts of power for sustained periods of time he would burn up the piece of "Swedish Stone" he had in the unit at the time. By

Non-Energy Forces Archive

large amounts of power I mean anything over 200 watts for more than an hour of continuous running. He could draw larger amounts of power, around 700 watts, for short runs of only a few minutes without burning up the "Swedish Stone." There are several accounts in the Fletcher files of him burning up the "Swedish Stone." At least one account by Moray himself. From page 188 of the fifth edition, I quote, "Meanwhile, the RE device had burned out during a test in Salt Lake City, because of an overload in the circuit. The so-called detector was no longer operative."

From all of this we see that before the end of the year 1942 Moray had destroyed the last remaining, bit of the "Swedish Stone" and was forced into research. This means in the 29 years between his return from Sweden in 1913 until late 1942 Moray had used up every last drop of the "Swedish Stone." Now he was forced to research radioactive materials to find a replacement for the now totally destroyed "Swedish Stone."

Now back to our analysis of the unit. This second item here is what I believe to be Moray's "Swedish Stone." As you can clearly see, it is in the input circuitry of the crystal radio and in-between the crystal radio and the antenna. So what exactly is this little bauble that is so nicely taped up to hide it from our prying eyes?

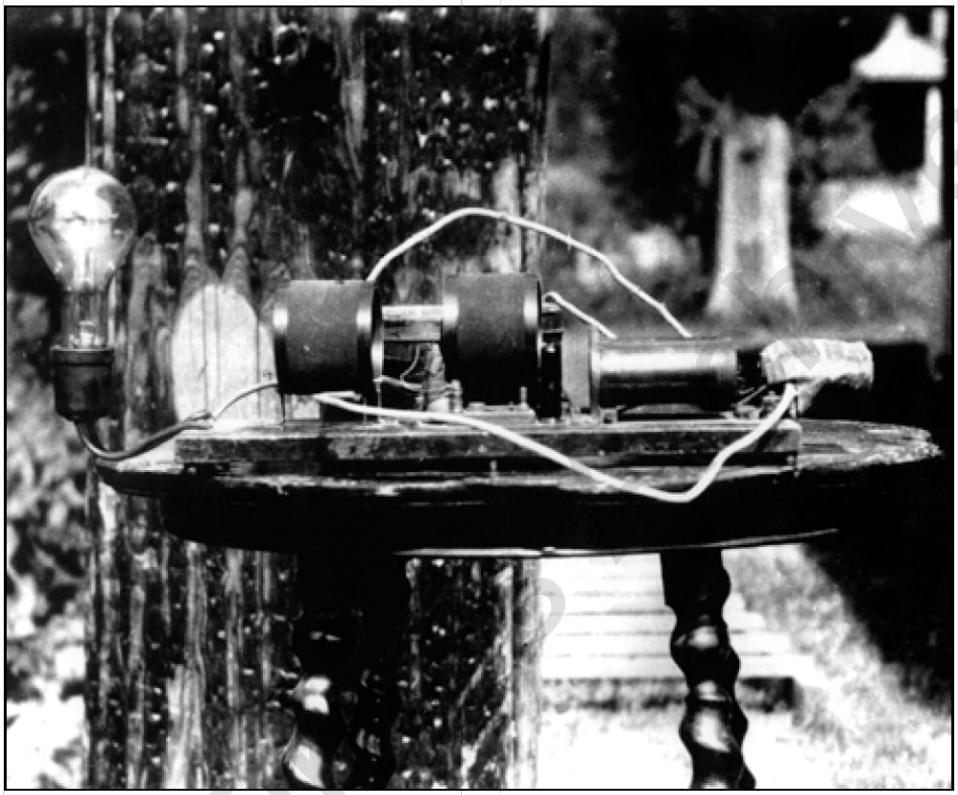
Harvey Fletcher was well known in that era and received the Nobel Prize for the development of the transistor. He had also witnessed the Moray device in the 1920's. He left his complete files to Brigham Young University before his death. In these files there is a rather large section on his involvement with and other information on Moray, which he had collected over the years.

I think this letter, dated October 8, 1928 that I found in these Harvey Fletcher files at Brigham Young University in Provo Utah says it all. I quote from the letter, "He also took a lump of lead treated according to his process, which he has invented, and used it in place of the crystal, and got wonderful reception of radio — loud enough in fact, to operate a horn speaker of the type put out by RCA about 1923."

The first mention of the "Swedish Stone" was in the publication *Beyond the Light Rays* in 1931, two years after Murray O. Hayes made the statement in this letter.

Murray O. Hayes wrote this letter to a potential investor who sent a copy to Harvey Fletcher and asked his advice if he should invest in Moray's invention.

Murray O. Hayes was at the time of this letter an investor and an officer in the Moray Products Development Company. He goes on in this letter and other correspondence to state that Moray had made full disclosure to him. I quote further from this letter, "This machine has been operated in my presence so many times, under so many different conditions of weather and season that I am positively convinced that it is what its inventor claims it to be, and that its commercial adaptation is feasible. I believe that Mr. Moray has explained all to me without reservation, and I am sure that this is a revolutionary and epoch- making invention."



One of T.H. Moray's devices. "Swedish Stone" (radioactive material?) is in the input circuitry of the crystal radio and in-between the crystal radio and the antenna. "So what exactly is this little bauble that is so nicely taped up to hide it from our prying eyes?" —Dr. Moreland. (Photo: Courtesy Dr. Moreland)

T. H. Moray himself in the fourth edition in 1960 says he found the "Swedish Stone" in a railroad car in Sweden in 1913.

Murray O. Hayes in 1929 says Moray invented the "Swedish Stone." T. H. Moray in 1942 in the fifth edition is quoted as never having been able to duplicate the "Swedish Stone."

He found it, he invented it, but he could not duplicate it! What inconsistencies we have here!

My research has led me to believe Murray O. Hayes was telling the truth in his description of the "Swedish Stone." It was in reality a lead alloy to which radioactive material had been added while molten and allowed to recrystallize.

Before I continue with this scenario I would like to show you one particular patent that has some merit. There are several patents that cover this type of action, this is only one of the many patents covering this type of action in my book titled *Patent Database for the Moray, Hendershot and Hubbard Devices*, which contains the full copies of over 150 patents. Now we have a better idea of what the elusive "Swedish Stone" might be.

Again It is my opinion that the "Swedish Stone" was a lead alloy of some type with radium or other radioactive material added to it. It is my further opinion that some amateur radio builder in Sweden gave him this material. Why do I say it was that and not a stone? Simple deduction. Lets say it really was a rock he found in a railroad car as he claims in the book. Why then when he was running out of the rock did he not go back to Sweden and get some more? Knowing the type of rock and knowing that Sweden is the general area, there would not be any reason not to go back to Sweden and track it down. Especially if the future of your whole invention rested on getting more of this material. It would certainly be easier to go get more than to try and duplicate it in the lab. So did he ever go to Sweden to look for more rock? NO he did not. Why? The only plausible reason is that it was not a rock, it was something he obtained from someone while he was in Sweden. So why not go back to Sweden and find this person and get some more or find out how that person made it? Maybe that person was no longer avail-

able?

I have been in contact for almost a year now with a fellow researcher in Sweden who has been helping me follow this scenario. I first got reports of this from a friend in Utah and have had the blanks filled in from the researches done in Sweden.

This is the story I have been able to piece together over the past few years. While T. H. Moray was in Sweden between 1912 and 1913 he was a missionary for the Mormon Church. All Mormons must go on a two year mission, a church rule. While on his rounds going door-to-door trying to convert people in the backwoods of Sweden to the Mormon religion, he met a particular amateur radio builder. From this person he acquired the infamous "Swedish Stone." This person would not tell anyone how he made it, but did say it contained lead and radioactive material. He would show people, including Moray, how it would amplify weak radio signals when placed in a crystal radio set. The crystal radio set he used was manufactured by the Erla company in Sweden.

Moray brought a piece of this material home and it was his ingenuity that used that simple little bit of amplification to generate usable electric power.

What happened to this person in Sweden? As best we can determine at this time, he was killed in World War I, which broke out shortly after Moray left Sweden and returned to America. The secret apparently died with him.

I will continue to work with my contact in Sweden and hope to have names, dates and places to offer as the final proof before my book is released, hopefully later this fall.

Now let's go back to this patent and see if we can figure out how to duplicate this material.

This type of material and the types in the patents will give some amplification. Not a whole lot, but some. In one test I ran I used a particular alloy I had made and doped with uranium which gave me a 12.5 watt output when used in a Moray type of radio receiver. I ran this unit intermittently for several days with no degradation in output. My output was nowhere near the 650 watts of Moray, but if I had a megawatt AM broadcast station nearby, as he had, maybe I could have gotten the 100 watts he had in the second generation device. Also, had I used multiple stages maybe I could have gotten the 650 watts he had in the second generation device.

This was the third generation Moray device. Moray ran this unit until some time in the late 1930's, and then nothing until the early 1940's. What happened in the middle? One thing I did find out in my tests was that the Moray type of radio with the alloy in it was a beautiful regenerative receiver! It re-broadcast the station along with a lot of noise that covered the whole bandwidth and interfered with radio and TV in the whole neighborhood. Because of this I could only test it late at night when everyone else was asleep. If my little 12.5 watt unit did this, what must a 650 watt unit have done to all of Salt Lake City? Also, somewhere in this time period the Federal Government started regulating radio transmitters to cut down on their power output and to keep them on frequency. This would have hurt the Moray unit severely, greatly diminishing its output or maybe stopping it completely. It is my opinion that this, combined with the lack of available "Swedish Stone," is what forced Moray into the lab to look for another way to do things.

Before going on to the next stage of the development of the Moray devices, I want to give some insight into the testing and claims of this unit. Supposedly the Moray unit was capable of putting out 50,000 watts. Well, it did put out that much in one test, the problem was how the test results were interpreted.

This is another letter from the Harvey Fletcher file. It documents the test in 1828 which the book says the unit had an output of over 50,000 watts. In the letter a test was conducted with the unit sealed in a trunk. During the test, two light bulbs, one 100 watt bulb and a 10 watt bulb, were connected to the unit. This test ran for 83 hours and 34 minutes. After the test, Moray connected a 575 watt flat iron and a 60 watt bulb to the unit to prove that more power could be drawn from the unit. Now if you take the 83 hours and 34 minutes and multiply by 635 watts you sure do get over 50,000 kilowatt-hours. The only problem is that is a total energy, not an instantaneous 50,000 watt power as they would have us believe. In actuality the unit only produced a continuous output of 110 watts during the test, which gives a total of slightly less than 10,000 kilowatt-hours of total energy production—not 10,000 watts of power. One more time the truth was distorted to give a different perception. But to many investors this was enough to separate them and their money. The complete Harvey Fletcher files are full of letters from potential investors wanting to confirm the stories they had been told before investing their money. The files also contain Fletcher's answers to them explaining that what said about the Moray device was being misrepresented. The files are full of Fletcher's opinion of Moray and what he thought Moray had really done. Here are a few quotes: "It cannot be investigated as long as Mr. Moray retains his present attitude."; "In my judgment Mr. Moray is not a scientific man at all and if he has anything worthwhile, it is by mere chance."; "If he has achieved something which is novel and useful it will be merely by accident rather than as the result of organized research."; "Recent developments have led me to question his sincerity."; "I advised my friends not to invest any money."; "Those who have tried to promote the invention have been double-crossed by Moray, just at the juncture when they needed his help to disclose the invention."

I strongly suggest any one interested in the true Moray read the Fletcher files. They give an insight into the man and his research that has never been seen before. It also lends credibility to my long-time theory that Moray did not know what he had or how it really worked and he was afraid to let anyone who could figure it out get too close because of his fear of them stealing it from him.

This is a picture (next page) of the fourth and final unit of T. H. Moray. In his research Moray came up with an acceptable type of alloy and a detector arrangement to allow him to build the device shown here. By staging these detectors in series, he found he could increase the voltage and current in each successive stage. This allowed him to build up to a voltage of approximately 250,000 volts and a current of approximately 12 milliamps. If you multiply this out using the formula of P=IE you will find this comes to 3,000 watts. In the picture we have 35 light bulbs and a flat iron. The top six rows all contain 50 watt bulbs. The five bulbs in the bottom row consists of 100 watt bulbs. The flat iron which drew 575 watts is also plugged into an adapter in the bottom row. If we add up all of this wattage we come up with a total of 2875 watts. This sure is a long way from the 50,000 watts claimed as the output. However it must be remembered that this much power could only be drawn for short periods of time as prolonged runs would overheat and burn up the "Swedish Stone, " or alloy as I prefer to call it. This device worked by the direct conversion of radioactive emanations to electricity and not from the conversion of some energy from space. The only energy from outside it needed was the small signal it got from a local radio station through the antenna. This signal was necessary only as a catalyst to both start and to sustain the conversion process. No form of cosmic radiation was either used or needed in any of the Moray devices. They operated by the direct conversion of alpha radiation to electricity without going through a heat cycle as in modern reactors

Before I move on to other free energy devices, I would like to give you my con-

New Energy Times Archive

clusions on the Moray devices. Despite all of the disinformation and total lack of information put out by the Morays, T. H. Moray really did have a working unit. It may not have put out as much power as claimed, but it did put out power from very little input and thereby qualifies as a major step in the development of free energy. The distrust of T. H. Moray of everyone who tried to work with him kept T. H. Moray from fully developing this product and getting it to market.

Now let us back up to someone who showed more success and showed it earlier than T. H. Moray. This person was a man named Harry E. Perrigo.

There is very little information published on his works, even though he out-performed T. H. Moray. As I stated earlier he predated and outperformed Moray by producing 4500 watts in 1922.

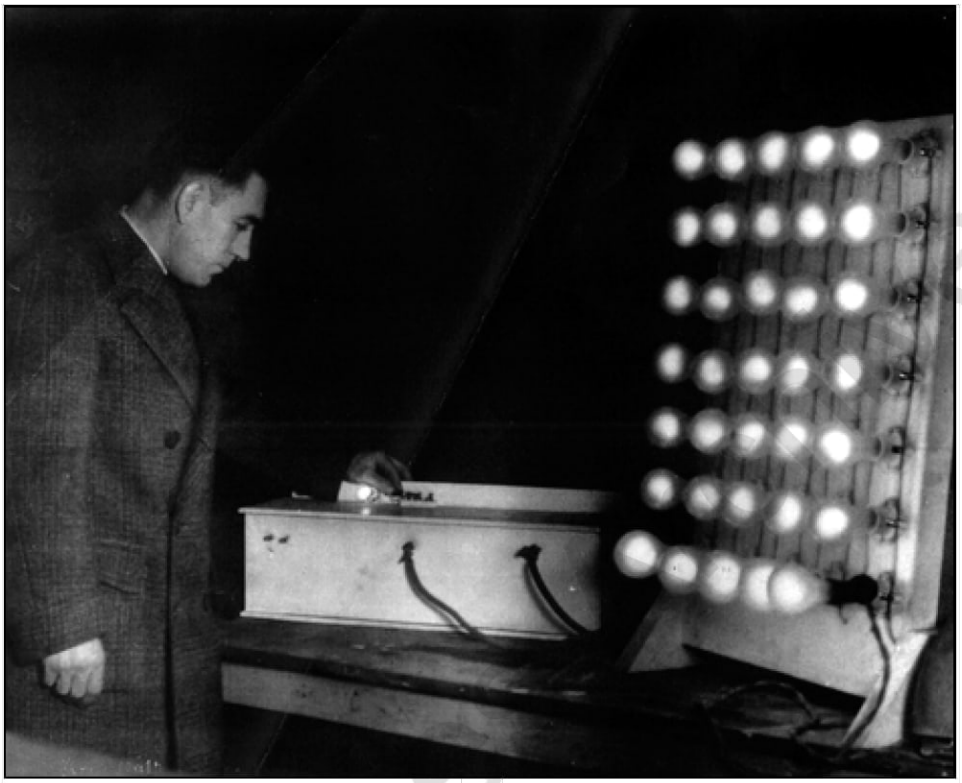
Here we can see some of the basic construction of his device. In these drawings we can see the antenna for input of RF energy, the two lead plates with the coil cores and coils. He stated that the secret was in the cores plugged into the lead plates on which the coils were wound. These coil cores can be seen here in the center of the picture and consisted of a bundle of cut lengths of steel wire which were coated with a radioactive material. The steel wires also acted as the magnetic core for the coil of copper wire which was wound on it. The lead plates were only used for shielding against the radiation. The radioactive material emitted alpha particles, which were captured by the copper wire and developed both voltage and current by being modulated with the incoming RF energy from the antenna. Any voltage and current output desired could be produced by changing the interconnections between the various coils. Again, we have the direct conversion of radioactive emanations to electricity.

Now let us move on to the Alfred Hubbard device.

The first picture shows Hubbard with his first device which produced 100 watts in 1919 and the second picture shows his last device powering a boat by driving a 35 horsepower motor by producing 26,000 watts in 1926.

This schematic diagram shows how the unit was constructed. Again we have steel cores impregnated with a radioactive material, radium in this case, wound with copper wire, interconnected coils to give the desired output voltage and current desired, and excited with an external source of AC current as a catalyst. Again, we have the direct conversion of alpha radiation to voltage and current.

The best detailed explanation of the Perrigo and the Hubbard devices are found in the patent and these two books by Dr. Paul Brown, since his device operates in the same manner as both of these devices.



The fourth and final unit of T.H. Moray, allegedly powering 35 light bulbs and a clothes pressing iron (extreme lower right in photo) —approximately 3,000 watts. ***(Photo Courtesy: Dr. Moreland)***

The next devices on our list are the devices of Lester J. Hendershot. This is a picture of one of his earlier devices which produced about 100 watts around 1930.

This is a schematic of the device. From this we can see a classic push-pull oscillator circuit with the doorbell circuit at the bottom setting the frequency and phase relationship between the push and pull circuits. Again there is very little constructive literature on this device. So where does the power to run this come from? Although Mark Hendershot admitedly denies that there was ever any radioactive material in his father's device, I have had my doubts for a long time. I mentioned my theory of how I though it worked to Bruce Perreault last year when we were speakers at the Tesla Symposium. He was interested, so I detailed how and where to add the radioactive material and how I thought it would work. Bruce then made a test setup to test my theory. Sure enough it worked, he got more power out than he put in. Not a whole lot of power, because it was a small capacitor but enough power to prove my concept. What I had him do was very simple, put the radioactive material on the dielectric of the hand-wound capacitors. How it worked is also very simple. The input coils or basket-weave coils pick up RF energy to start the process, then the radioactive emanations, alpha particles again, are modulated by the RF energy to produce the necessary voltage and current. As if this conclusion will come as any surprise here again we have the direct conversion of alpha particles to electricity.

We now move to the Testitaka free energy generator from Switzerland which was first shown in the early 1980's. This is a front view of the three-kilowatt unit. I am sure most of you have seen the front of this unit but how many have seen the rear of this unit?

Here on the rear of the machine we see the heart and soul of the machine. The two tall silver cylinders are high voltage capacitors and the circular unit at the bottom and center is the high voltage distributor that furnishes the high voltage pulses to the sectors to drive the unit via the Poggendorff principle.

Here we have a close-up view of the high voltage distributor showing a spark jumping across one set of contacts.

This is a drawing of a unit being driven by high voltage using the Poggendorff principle.

As you know, or maybe you did not know, the sectors of this modified Wimhurst generator are made of stainless steel. Both counter-rotating wheels pass through horseshoe magnets on both the left and right sides of the machine. These magnets have coils wound on the center curvature of the horseshoe. So how does it work? Again, there are very few facts known about this unit, however there are a lot of speculation about how it works. So here

New Energy Times

are my thoughts and deductions on how I think it works.

Here we see a patent for a high voltage generator using radioactive materials. This is just one of the many patents in my book *Patent Data Base* showing how to use radioactive materials to make high voltage generators. If the two tall capacitors on the rear were radioactive high voltage generators we would have the high voltage needed to feed the distributor to power the unit. The high voltage generators in the patents can generate voltages for a single capacitor of over four-million volts. These capacitors can be connected in series to produce as high of a voltage as you wish. The only limit to how high is the insulation used to prevent arcing.

Here we have a patent that shows that large amounts of power can be generated by generating high voltage with radioactive material. This patent shows a unit that can generate from 0.5 kilowatts to 500 kilowatts in the same unit just by changing the amount of radioactive material in the unit.

Now we have a way to make the unit rotate for free, so where do we get the output power? Remember the stainless steel segments and the horseshoe magnets with the coils wound on them? When these sectors rotate through the center of the horseshoe magnets the are not attracted or repelled because they are stainless steel. However, they do disturb the magnet lines of force in the field of the magnet which is transferred to the coils on the magnets thus producing current without the nagging back drag effect of most magnetic generators. The problem is that the current produced is small in comparison to regular magnetic generators. However, in this unit that does not present any problem. If you remember most Wimhurst generators can easily produce 100,000 volts. So if the output is three kilowatts and we have 100,000 volts the formula P=IE tell us we only need 30 milliamps of current. This is easily produced with the setup in this unit. The glowing horizontal tube at the top and center of the unit is a tube filled with a mixture of helium and neon to act as an output voltage regulator to limit the output voltage to what ever voltage is desired.

Now to the final part of my presentation. Where do I think the increased power of the new super-magnets come from? I will give you three guess and the first two do not count. RADIOACTIVE MATERIALS! In the following charts I will show the naturally occurring radioactive isotopes of some of the materials used to make these super magnets.

Here we see the chart for Cerium. It has only one isotope which accounts for 11.07 % of the naturally occurring material. We also see that it is an alpha-emitter with an energy of 1.5 Mev.

Here we have the chart for Neodymium. We see Neodymium has only one isotope which accounts for 23.85 % of the naturally occurring material . The alpha particle emitted has an energy of 1.8 Mev.

Here we have the chart for Samarium. As you can see, Samarium has three isotopes which account for a total of 40.04 % of the naturally occurring material. The energies of the alpha particles emitted are 2.24, 2.14 and 1.84 Mev.

It is evident that as the percentage and energy of the alpha particles increase, so does the power of the magnetic material produced when incorporating this material into magnets. Another interesting property of these magnets is that once the material is compressed in the mold and before it is energized to make it magnetic, a Geiger counter will register activity from the radioactive material. However, once the material is energized and becomes a magnet, absolutely no radiation can be detected. My theory is that the energy of the alpha particle is being converted to magnetic energy and thus increasing the magnetic power of the magnet as the percentage of radioactive material and or the energy of the alpha particle is increased.

I guess the next step is a logical one. My question and thereby the proof of my hypotheses would be to make a magnet using the ultimate of the easily obtainable high power alpha sources, uranium. As you can see from this chart the isotope U238 accounts for 99.27 % of the naturally occurring material. The energy of the alpha particle emitted is a whopping 4.5 Mev—over twice the energy and percentages we find in samarium. This means, if my theory is correct, a magnet made with uranium should have at the minimum twice the magnet power of a magnet made with Samarium. As soon as I can arrange adequate funding I intend to try this out.

In conclusion, I hope my talk today has been informative and not too boring. I have done my best to show the connections between free energy, increased energy and radioactive materials, alpha emitters in particular.

I wish to take this opportunity to thank the Academy for the honor of inviting me to speak to you here today. I also wish to thank each and every one in the audience for giving me the privilege and honor of addressing you today. Again thank you one and all. I will now try to answer any questions you may have.

AZTEC PUBLISHING
1251 Smith Thompson Road Bethpage, TN 37022
Phone 615-888-3428 Fax 615-888-3428
htpp://www.aztecpub.com

A sample of Books available as of 5/22/97
Prices effective through 6/30/97
* Denotes Recently-released book

MORAY SERIES

•—***The Sea of Energy in Which the Earth Floats*** by T. Henry Moray 4th edition 1960. With added material by John W. Moreland, Ph.D.198pages ($24.95)
•—***The Moray Device -- Its Workings*** by Rodney Sego 1997 61pages ($19.95)
•—***The Moray Radiant Energy Device***, Operational Parameters, Design Criteria and Considerations, by Paul M. Brown, Ph.D. 1997 160Pages Contains 16 photographs of his laboratory that are available in B/W or Color (B/W version, $39.95; Color, $49.95))
•—***Speech Given by John W. Moreland, Ph. D. at the ANE conference in Denver Co. on May 25, 1997***. Copies of all visual exhibits used in the speech are included 45 Pages — ($19.95)
•—***Patent Data Base for the Moray, Hubbard and Hendershot Devices***, 1997 by John W. Moreland, Ph.D., Contains over 160 full patents, ($49.95)
—***Isotopic Power***, By Paul M. Brown, Ph. D. 1995, 240 pages ($44.95)

RADIATION and PHYSICS SERIES

—***The Chemistry of Uranium*** by Joseph J. Katz, 1951, 609 pages, ($34.95)
—***The Chemical Effects of Alpha Particles and Electrons*** by Samuel C. Lind 192, 182 Pages ($19.95)
—***Radiations From Radioactive Substances*** by Sir Ernest Rutherford 1951, 588 pages ($39.95)
—***Radioactivity and Radioactive Substances*** by Sir James Chadwick 1953, 120 pages ($14.95)
—***Radioactivity*** by Ernest Rutherford 1905, 580pages ($39.95)
•—***The Evolution of Matter*** by Gustave Le Bon 1907, 439 pages ($34.95)
•—***The Evolution of Forces*** by Gustave Le Bon 1908, 388 pages ($29.95)
—***Practical Measurements in Radioactivity*** by H. Geiger, Ph.D. 1912, 151Pages ($19.95)
—***Radium and Radioactive Substances*** by Charles Baskerville, Ph. D. 1905, 164 pages ($19.95)
—***Ions, Electrons and Ionizing Radiation*** by James Arnold Crowther 1927, 328 pages ($24.95)
—***Electron Physics*** by J.Barton Hoag,Ph.D. 1929, 207 pages ($19.95)
—***Photons and Electrons*** by K. H. Spring 1950, 108 pages ($9.95)
—***The Electron*** by Robert Andrew Millikan 1917, 268 pages ($19.95)
—***The Rays of Positive Electricity*** By Sir J.J.Thomson 192, 237 pages ($19.95)

ENERGY SERIES

—*Energy and Matter,* by Charles B. Bazzoni 1934 137Pages ($14.95)
—*Alternate Energy Notebook*, by Paul M. Brown, Ph. D. 1995 177 pages, ($39.95)

Send us your Classified Ad Today, !!!!
Only $0.50 per word per insertion.

AN ALTERNATE INTERPRETATION OF MASS-GAIN AT NEAR LIGHT VELOCITIES

Paul M. Brown, Ph.D.
9510 Sunflower Lane, Boise, ID 83704 (208)373-7872

EDITOR'S INTRODUCTION:
This is the first of a series of three articles by Dr. Paul Brown, which we are told will lead to the explanation of the observed performance of the Brown **resonant nuclear generator** (U.S. Patent #4,835,433—Apparatus for direct conversion of radioactive decay energy to electrical energy, issued May 30, 1989). The second article will cover "the energy of decay particles," while the third article will tie it all together by explaining where the energy comes and goes.

In Brown's 1989 patent, #4,835,433, under section 5 it states that from a combination of 200 grams uranium, 100 grams thorium and one millicurie of radium, Brown generated electrical power on the order of 400 volts, 23 amps at 86 KHz. A quick calculation shows that the kinetic energy of the decay from this source is several orders of magnitude smaller than the electrical power produced.

Paul Brown told me in Colorado Springs (at the 1997 Tesla Society meeting) that a nuclear battery of his design ran for two months putting out 75 watts of electrical power continuously. The power source was only ( ) of strontium-90, which would only have a maximum possible energy output of, within conventional physics.—EFM

• • • • • •

SUMMARY

It will be shown that the current interpretation of the data generated by particle accelerators is erroneous. Counter to conventional orthodoxy the rest mass or gravitational mass of a particle remains constant even at relativistic velocities while an increase in the inertial mass of a particle is measured due to the added inertia of the magnetic field carried by the charged particle.

INERTIA

The Law of Inertia or Newton's First Law says that a body at rest tends to stay at rest and a body in motion tends to stay in motion in a straight line unless acted upon by outside forces; this is inertia. By definition, inertial mass is a measure of the inertia of a body.

Newton's Second Law defines force as any action capable of accelerating an inertial mass $\mathbf{F = m_I a}$.

GRAVITATIONAL MASS

Gravitational mass is then defined as a quantity that determines the strength of the gravitational force between two objects, i.e., the gravitational force on a body is proportional to its gravitational mass. Under terrestrial confines, the gravitational mass of a body with respect to the earth is

$$m_G = [(G(M_e/r_e^2) - F)]^{-1}$$

CHARGED PARTICLES

Consider a charged particle with a radius **r**, carrying a charge of electricity **q**, first at rest and then moving with the velocity **v**. The stationary charged particle has an electrostatic field with lines of force directed radially outwards (Figure 1); in consequence of its motion, the moving charged particle has, in addition, a magnetic field with circular lines of force around the axis of motion, which is carried with it (Figure 2). All in accordance with the Laws of Maxwell.

The motion of the charged particle con-

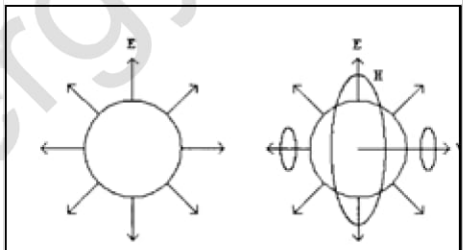


Figure 1. Figure 2.

stitutes a current element of magnitude **qv** and the magnetic field intensity **H** at any point distance **d** from the spherical charge is given by

$$H = B/\mu$$

where B is the flux density, $\mu P/(4\pi d^2)$

The presence of a magnetic field around the moving body implies that magnetic energy is stored-up in the medium surrounding it. In a magnetic field of strength **H** the magnetic energy stored up in a unit of volume of the medium of unit permeability is given by $B^2/(8\pi)$. Integrating the value of this expression over the region exterior to a sphere of radius **r**, the total magnetic energy due to the motion of the charged body is given by

$$q^2v^2K/(3r)$$

where $K = 3.336 \times 10^{-4}$.

The magnetic energy, due to this motion, is analogous to kinetic energy, for it depends upon the square of the velocity of the body. In consequence of the charge carried by the particle, additional kinetic energy is associated with it. The magnetic field exhibits properties of inertia. If the velocity of the charged particle is altered, electric and magnetic forces are set up tending to stop the change of motion (Lenz's Law), and more work is done during the change than if the particle were uncharged. Lenz's Law says that the induced field will appear in such a direction that it opposes the change that produced it. The ordinary kinetic energy of the particle is $1/2(mv^2)$. In consequence of its charge, the energy associated with it is

increased by $q^2v^2K/(3r)$.

It thus behaves as if it possessed a mass $m + m_1$ where m_1 is the "electrical mass " (Ref.1). The force that is necessary to set the stationary particle into motion is thus greater for a charged particle than for an uncharged particle, assuming equal gravitational mass.

Moving Neutral Particle

$$K.E. = 1/2(mv^2)$$

Moving Charged Particle

$$K.E. = 1/2(mv^2) + q^2v^2K/(3r)$$

KINEMATICS

A force **K** that acts for a short time **t** represents an impulse $\mathbf{J = Kt}$ which produces a change of velocity **w** in a mass m_G as given by $\mathbf{m_G w = J}$. If the mass carries a charge, a definite impulse **J** will produce a small change of velocity and the remainder $\mathbf{J_1}$ will be used to change the magnetic field. Thus for a charged particle we have $m_G w = J - J_1$.

Now, calculation gives the rather obvious result that the impulse **J**, necessary to increase the magnetic field is greater, the greater the change of velocity **w**, and it is approximately proportional to this change of velocity. Thus we may set $\mathbf{J_1} = m_1 w$. We

New Energy Times Archive

then have

$$m_G w = J - m_I w \quad \text{or} \quad (m_G + m_I)\, w = J$$

where m_G is the gravitational mass and m_I is the inertial mass due to electromagnetic induction of the magnetic field.

In other words, the work performed to accelerate a charged particle manifests itself in two ways, (1) the increased velocity of the particle and (2) increased magnitude of the magnetic field about the particle.

Rest mass is defined as the measured mass of a body at rest in the reference frame. The rest mass of an electron is measured with respect to the earth under gravitational influence and consequently the measured rest mass m_o is actually a measure of the gravitational mass m_G .

A 1 GeV electron has a rest mass or gravitational mass m_G of 9.107×10^{-31} kg and a velocity of 2.9999994×10^{8} m/sec, which yields an apparent mass m_A of 1.44×10^{-27} kg all in accordance with relativity theory and experimental observation. What I claim here is that the gravitational mass m_G has remained the same and the difference between the apparent mass m_A end the gravitational mass m_G is the inertial mass m_I (ref. 2).

$$m_A - m_G = m_I$$

$$1.44 \times 10^{-27}\ \text{Kg} - 9.107 \times 10^{-31}\ \text{Kg} = 1.439 \times 10^{-27}$$

At this near light velocity, the inertial mass is about four orders of magnitude greater than the gravitational mass and for this example the mass/energy relationship ($E = mc^2$: 8.99×10^{16} J/Kg) shows this inertial mass to be equivalent to 1.294×10^{-10} Joule . The theoretical energy present in the magnetic field is $q^2v^2K/(3r) = 1.364 \times 10^{-10}$ Joule. There appears to be close agreement between the expected theoretical value and the observed value to within 6% (Ref. 3).

We now have a logical explanation as to why the apparent mass of a body increases as its speed increases. This also dispels one of the idiosyncrasies of special relativity; namely that "mass is not a unique property of a body. Two observers will measure the mass of a body differently, if their velocities relative to the body are different."

CONCLUSION

We now see light velocity as a maximum factor for charged particles due to Lenz's Law and the infinite energy required to overcome the infinite resistance to further acceleration by the magnetic field, not as a physical limitation to the gravitational mass. This means that uncharged particles have no such velocity limitation. Further, it is of interest to note that charged particles have been known to "run away from their magnetic fields" as demonstrated by the Cherenkov Effect.

Gravitational mass and inertial mass are not one and the same. Inertial mass is relative, while gravitational mass remains constant. Many of the basic axioms of physics must be re-evaluated in this light to present a true picture of our universe.

BIBLIOGRAPHY

1. Brown, Paul, *ALTERNATE ENERGY NOTEBOOK*, Aztec Publ., (615) 888-3428, 1st Ed. 1992.

2. Brown, Paul, "The Inequivalence of Inertial and Gravitational Mass," *Raum & Zeit* Magazine, Vol. 1, No. 5, Dec-Jan 1989-90, p. 75-7.

3. Brown, Paul, *ISOTOPIC POWER*, Aztec Publ., (615) 888-3428, 1992.

U.S. Patent 4,835,433:

Apparatus for direct Conversion of radioactive decay energy to electrical energy

Issued: May 30, 1989, Filed, Feb.8, 1988

Inventor: Paul M. Brown of Boise, Idaho

ABSTRACT: A nuclear battery in which the energy imparted to radioactive decay products during the spontaneous disintegrations of radioactive material is utilized to sustain and amplify the oscillations in a high-Q LC tank circuit is provided. The circuit inductance comprises a coil wound on a core composed of radioactive nuclides connected in series with the primary winding of a power transformer. The core is fabricated from a mixture of three radioactive materials which decay primarily by alpha emission and provides a greater flux of radioactive decay products than the equivalent amount of a single radioactive nuclide.

Claim #1. Apparatus for converting radioactive energy to electrical energy, said apparatus comprising:

· an electrical conductor wound on a core to form an inductor having a first inductance, said core being of radioactive material;

· a capacitor having a predetermined capacitance C;

· a transformer having a primary winding, a secondary winding and a transformer core, said primary winding and said secondary winding wound on said transformer core, said primary winding having a second inductance, said secondary winding for coupling electrical energy to a workload; and

· electrical conductor means for connecting said inductor, said capacitor and said primary winding in series fashion to form a series LCR circuit wherein electrical oscillations are induced, said electrical oscillations being sustained and amplified by the energy transferred to said electrical conductor by the radioactive decay of said radioactive material, wherein L is the sum of said first inductance and said second inductance and R is a predetermined resistance.

Dr. Paul M. Brown at 1997 Tesla Society Meeting
(Photo: by Gene Mallove)

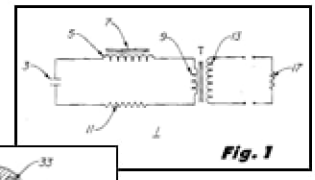


Fig. 1

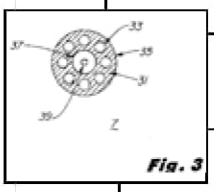


Fig. 3

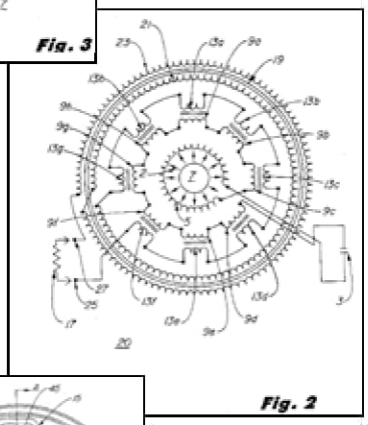


Fig. 2

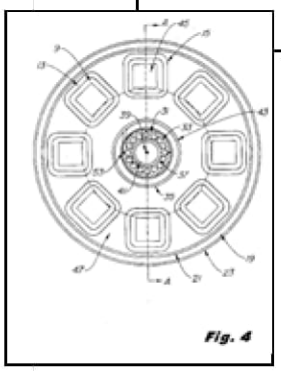


Fig. 4

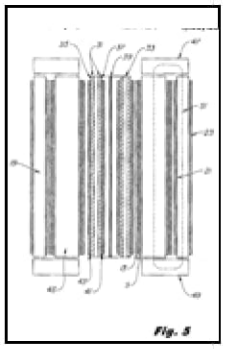
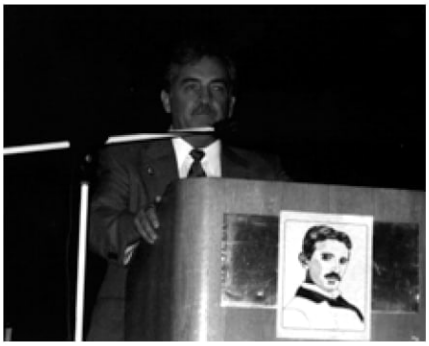


Fig. 5

New Energy Times

1997 International Tesla Society Meeting

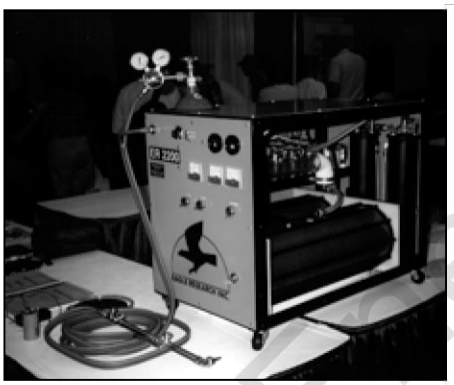
Colorado Springs — July 10--13, 1997 *(Photos: by E. Mallove)*



John W. McGinnis ("JW"), President of the Internaitonal Tesla Society, Colorado Springs, CO speaks to the gala dinner.

Eagle Research, Inc.
Phone/Fax: 250-429-3132

George Wiseman of Eagle Research in BC, Canada, spoke about his openness in disclosing and publishing improvements to such technologies as Brown's Gas Generators and high-performance carburetors. The improved BG unit Eagle displayed and demonstrated at the conference is said to double the amount of gas generated in a given time interval—compared to Yul Brown's devices.



(Top) Eagle Research's Brown's Gas Generator on display in exhibit room. (Bottom Photo): Inside look at multiple metal plates in dual-chamber Brown's Gas generator. The device is an extremely advanced welding unit—operating, Eagle claims, for $0.50/day of continuous electrical input, compared with $25.00/day for welding gases. The fuel is water! The flame cuts steel but you can run your hand quickly through it—safely!

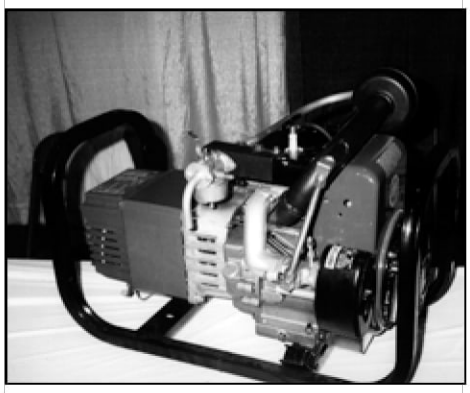
A meeting with a somewhat broader perspective that the Academy of New Energy, the annual International Tesla Society meetings focus on alternative medicine and wellness issues, as well as on new forms of energy, and advanced but non-controversial technologies—such as fiber-optics and semiconductor chip technology. It was a very enjoyable potpourri for the mind.

This was my first Tesla Society meeting, and it was a great privilege to have been invited by President J.W. McGinnis to speak on Cold Fusion. Earlier, Mr. McGinnis had had me as a guest on a few of his syndicated radio programs. This exposure seems to have caused quite an awakening to cold fusion by members of the Society. Many of them, who work on even more heretical machines and sciences, were under the impression that cold fusion was on shaky ground! This shows the power of the false ideas that have circulated about CF.

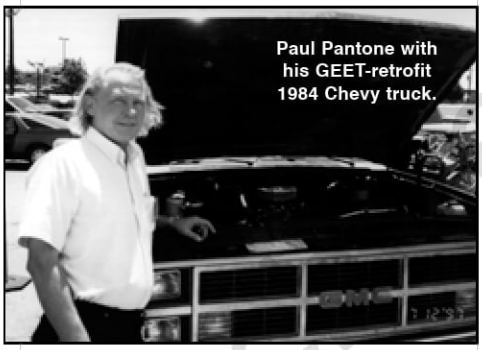
There were workshops to attend, devices to see and witness, and a mind-boggling commercial book store, run by Tesla throughout the meeting. This was a great joy to browse; alone, it would make the annual meeting worth attending—like the ANE meeting.

Paul Pantone was there, as he had been at the ANE meeting. But here he had his 1984 Chevy Suburban (350 cu. inch) truck that was retrofit with his GEET engine technology. Paul claims that without retrofit, the truck's gas consumption is 8.5 mpg, but with retrofit it is around 30 mpg. I urged him to make a lengthy video tape of a full-bore driving run on a test track so that the entire world could appreciate the claim.

The GEET-retrofit Coleman engine generators he was selling there at $1,350/unit he claims will run a 4.5 kW electric power load for 28 to 45 minutes. By contrast, he claims the non-retrofit unit will run only 12 to 14 minutes with the same load! *It would have been wonderful to have seen a side-by-side comparison.* That is what I hope to see in the future. The best thing about Paul and his people is that they are completely open about discussing the workings of their technology. They are hands-on people. And, they are gradually increasing their marketing efforts. They are actually *selling* devices that look better and better! If we were not so bogged-down at the moment with cold fusion activities, per se, we'd like to do more investigating of Pantone's extremely intriguing technology. There well could be a connection between CF and GEET, given the highly reduced carbon levels in the exhaust. —*EFM*

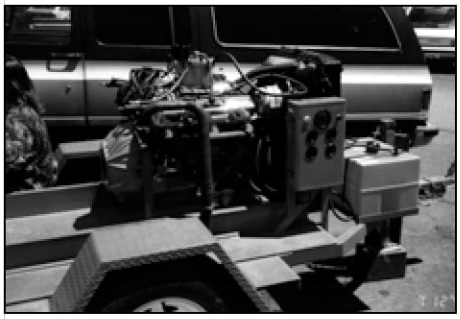


Pantone's GEET-retrofit 10 HP-Coleman generator. For sale (and in stock) at Tesla for $1,350



Paul Pantone with his GEET-retrofit 1984 Chevy truck.

To write or call Paul Pantone, GEET:
P.O. Box 439
Price, Utah 84501
Ph: 801-637-2654 Fax: 801-637-3198



Truck engine, GEET-retrofit, mounted on a trailer. And brought to the Tesla meeting.

Testing the Ragland Triode Cell

by Christopher Tinsley and Jed Rothwell
Contributing Editors, *Infinite Energy*

Abstract

We purchased two Ragland triode cells, and tested one in a simple but accurate flow calorimeter. We observed no excess heat. We were not able to test a second cell because of a problem with the cathode construction. Ragland claimed [*Infinite Energy*, Issue #10] that his triode cold fusion cell increases the likelihood of generating excess heat, even with poor cathode material, because it enhances electrodiffusion and the "deuteron sloshing" effect. To date, we have tested one cell and Scott Little of Earthtech International has tested two. No excess heat was observed in these three tests. The Ragland cell may or may not be an improvement on an ordinary diode cell —we cannot judge on the basis of only three tests — but we can conclude that it is not a panacea, and it does not work as well as Ragland hoped. Fleischmann has recommended that we employ a special grade of palladium from Johnson-Matthey. Unfortunately, this would cost £20,000 ($33,000) which is more than Ragland or we can afford at this time.

Recent years have seen a shift of interest away from looking for excess heat and other effects from the electrolysis of heavy water with a palladium cathode, a process often referred to as "classical cold fusion." Although these effects have the best history of replication and publication, they do require not only some expertise with electrochemistry but also suffer acutely from a materials problem with the palladium metal. Storms and others have shown how to select palladium, using a laborious and expensive protocol (expensive because of the high cost of the metal), and Professor Martin Fleischmann has explained that what he refers to as "Johnson-Matthey Type A" palladium is far more likely to work. However, to obtain that material would mean having quite a large ingot made specially, and the cost of that is beyond our means.

We were therefore very interested to hear of the work of Celani in Italy, and of Evan Ragland in the US. Both had found considerable success using electrodiffusion techniques. This keeps the deuterons (ions of heavy hydrogen) moving around inside the metal lattice, rather than simply trying to cram in as many as possible, and appears to improve the chances of a piece of palladium "working" as a cold fusion cathode. However, we spoke with Edmund Storms before the tests began. He remarked that he did not think the triode would enhance the cold fusion effect significantly, and that triage tests of the cathodes would still be necessary.

Evan Ragland has been working with a cell design having two separate platinum anodes (the positive terminals) and a single palladium cathode mounted between them, thus making a triode assembly. We purchased two of these cells, and they were shipped to me (in England) for test, but in fact this was a joint effort with Jed Rothwell in Atlanta: we were able to discuss methods and, perhaps more important, the computer log output from a full day's work could be e-mailed in a few seconds to allow Jed to analyse the results using the supplied software and his "store bought" (and home-grown) programs.

The cells were made to a good standard. Upper and lower thick teflon bases were bolted to a thick-walled glass tube and sealed with rubber O-rings. The electrode frame was mounted inside the tube, which also contained a considerable length of 5mm external diameter plastic tubing which acted as a heat-exchanger. Other ports were provided for the electrical connections and the various accessories such as a thermometer and a heater element for calibration purposes. Ideally, all the ports would have been at the top (non-leaky) end and the cell would have been mounted in a bowl-shaped vessel, but the design did in fact work well and did not leak.

Flow calorimetry was used, and this is simple enough in theory. The power input to the cell is:

Power in = heater volts x heater current + electrolysis current x (electrolysis volts - 1.54V)

(The figure of 1.54V is the dissociation voltage of heavy water, and that voltage multiplied by the current will give the power which is used by the cell to dissociate its heavy water into deuterium and oxygen at a calculable rate.)

The power output of the cell is:

Power out = cooling water flow rate x 4.19 x (output temperature - input temperature)

The figure of 4.19 is the number of joules required to heat one millilitre of water through one degree Celsius, the flow rate is in millilitres per second, and the temperatures are in degrees Celsius.

So, the physics is simple enough, but the engineering rather less so. Since the cell is a source of heat it will be losing heat to its surrounding, and so it needs to be calibrated. It also needs to be in an environment which is stable enough not to intro-

New Energy Times Archive

duce destabilising effects. It may be of some interest to explain how we went about doing the tests.

We used a small room, and kept its temperature reasonably constant with a thermostatically controlled fan heater. The heater's internal thermostat was rather crude, so a separate one was connected and placed on the work bench. The actual cell was placed inside a plant propagator, the base of which was heavily insulated with polystyrene, and which contained several litres of water. The transparent lid was easily removed for access, and all the wiring and plumbing came through holes in the polystyrene. The inlet cooling water was kept at a steady flow rate by using a contant-pressure head device, which was supplied by a car windshield-washer pump and whose overflow was used to keep the pump cool. The inlet water passed through some ten metres of tubing kept below the surface of the water in the enclosure, thus ensuring that its temperature on entry to the cell was pretty constant. It then passed over the probe of a digital thermometer, and just before the cell it passed over a thermistor. On exit from the cell, it passed another thermistor and finally another digital thermometer before being reurned to the external reservoir and being pumped around again. In the early stages a flow meter was used, but this proved to be less than wholly reliable, so absolute checks were made on the flow rate using a graduated cylinder to catch the water as it left the cell.

The data was recorded with a Pico 11-channel analogue-to-digital (A-D) device and its associated software running on a PC. The Pico, the anode switching relay and the Instek power supplies used to provide the electrolysis power and the reference voltage for the thermistors gave excellent service, and we can recommend them. Each parameter was reduced to a voltage of between 0 and 2.5V for the Pico unit. This was done using various resistor networks made from high stability components built into a special-purpose box bristling with switches and sockets, and the numerical outputs from the A-D converter were calibrated with other instruments, thus allowing for any minor deviations anywhere in the measuring system - not that there were any of significance. The thermistors were calibrated with a mercury-in-glass thermometer and with a good-quality digital one. For the cell temperature and the enclosure temperature this calibration was straightforward, but for the two flow temperature sensors a rather more elaborate method was used. The thermistors were "curve-matched," giving almost identical results, but calibration points were found such that for each thermistor we knew where a changeover from one digital thermometer temperature to another (0.1 C lower or higher) coincided with a change from one A-D converter numeric value to another. These values were given to the Pico software for it to use in a look-up table.

Ragland cell mounted before testing in chamber.

For example, a set of data might have looked like this:

Digital thermometer	Thermistor A digital value	Thermistor B digital value
22.5	871	871
22.5	872	871
22.5	873	872
22.4	874	873
22.4	874	874

If a long series of such readings are taken while agitating the water bath as it very slowly cools, it becomes possible to graph them and derive the slope of the thermistor digital values relative to the digital thermometer temperature. The graph shows just when a change to the thermistor digital value must have coincided with a change to the thermometer digital reading. This process helps make separate look-up tables from which the software can derive the curve for each thermistor, and appeared to give very close convergence between the two thermistors. The accuracy of the digital thermometer is not so very important here, because we are interested in temperature *difference*. The thermometer was, even so, calibrated against a good mercury-in-glass instrument, and was found to track it (as best we could read the glass one).

The computer monitored the calibration heater current and voltage, the anode currents and voltages, the flow rate and the four thermistors. Although the computer was giving constant graphical displays of the behaviour of the cell, we had meters for observing currents and two digital thermometers showing (approximately) the inlet and outlet temperatures; this meant that any problems with the computer monitoring would be quickly noticed.

As may be guessed, some of the design features (like the long run of underwater tubing) were responses to problems encountered. Quite a few of the improvements (and a lot of the work) came from Susan Seddon. One particular difficulty was the ingress of moisture into the thermistor housings. We found the best answer to that was fit them into lengths of low-temperature heat-shrink tubing, shrink the tubing down, and then melt the end with a soldering iron before clipping off any excess. Each assembly was then fitted into a T-piece tube intended for use in a car screen-wash and sealed with PTFE (Teflon) tape. Very slight leakage from the T-pieces was not especially important with this technique. As mentioned, we had trouble with the flow meter (McMillan Company #111 digital flowmeter). At first this was thought to be caused by some fault in the plumbing, but it was easy to see on the computer screen that the calculated power extracted by the flow of water was shown as tracking perfectly with the indicated flow rate, and the delta-T (the temperature change of the water as it went thorugh the cell) remained constant, showing that the apparent variations in flow rate were due to the flow meter.

The heater in the cell was made by breaking up a wire-wound resistor and coiling its wire around a heat-resistant core before inserting into a 5mm glass tube which was fitted into the cell. As with the other power calculations, both voltage and current in this heater were monitored so that its true heating power was known at all times.

The basic calibration of the cell was done by first running it for a day with no input power. This established a zero. It was then necessary to present the cell with heat pulses from the auxiliary heater running at various power levels up to around 12 watts. One of these pulses is shown, they usually ran for about an hour to allow the cell to stabilise and then monitored as the cell cooled again. All such runs showed that the cell would recover around 80% of the heat energy which it received. There were some problems with poor mixing of the cell electrolyte, the system behaving slightly differently when the bubbles from the electrolysis mixed the electrolyte, but this was easily parameterised by turning on the heater during electrolysis and observing its behaviour.

Jed describes this process more rigorously:

New Energy Times Archive

Calibration runs

After rebuilding the thermistor probes to eliminate the problem with moisture, before starting electrolysis, we calibrated several points with joule heater: 1.3, 5.3, 5.6, 9.7 and 10.1 watts. Two pairs close together (5.3 and 5.6, 9.7 and 10.1) were chosen to test the ability of the instrument to discriminate small differences in power levels. Discrimination was better than we had hoped for. Data points from these power levels did not overlap.

To calibrate, a power level is selected and held for 90 minutes to 3 hours. The Delta T temperature (outlet minus inlet) stabilizes after 50 minutes. Figure 1 shows calibration for nominal power levels of 5 and 10 watts. The inlet temperature rises gradually throughout the run because we have no cooler; heat is shed from the two cooling water tanks outside the cell into ambient air. The water tanks must gradually grow hotter than the surroundings. This is a source of noise. However, the cooling fluid tanks hold 2 liters of water, and this thermal mass is big enough to dampen most noise from short term fluctuations in ambient temperature.

When input power is 5 watts, 4 watts are recovered by the heat exchanger. When input power is 10 watts, 8 are recovered. Eighty percent of the heat is recovered by the heat exchanger, 20% is lost from the sides and top of the cell. At power levels below 5 watts, less heat was recovered. At the lowest power we tested only 75% of the energy was recovered, and the thermistors within the cells showed increased thermal stratification, so we conclude that at low power there is little stirring and more heat is lost from the sides and top of the cell above the cooling water coils.

On-the-fly Recalibration during Electrolysis

During electrolysis, the joule heater was turned on once a day for several hours to ensure that the calorimetry was still working correctly. Without this precaution, thermistors may drift unnoticed; dampness, short circuits, or other problems may cause the instruments to indicate spurious excess heat. This technique is sometimes called "on-the-fly recalibration."

Figure 2 shows four hours (14000 seconds) of data. During this period, electrolysis was steady at 1.75 watts. Electrolysis heating is computed at 1.14 watts, based on the equation I*(V-1.54) for heavy water. During electrolysis, up to 89% of the heat is recovered by the heat exchanger. During joule heating calibration 75 to 81% was recovered by the heat exchanger. We believe that stirring from electrolysis enhanced the recovery rate. The joule heater was turned on for 73 minutes (4380 seconds, from 3480 to 7860). Average heater power was 1.41 watts. Total energy was 6221 joules, as measured on the spreadsheet, which is a bit more than average power times seconds. Before the pulse began, from minutes 1000 to 3000, output from the cooling loop was very steady at 1.02 watts, or 88% of input. This is designated the baseline. Total energy from the calibration pulse is the area above the baseline from second 3840 to 13050. At the end of this time, output has returned to nearly the same level it was before the heat burst. It remains 30 mW above the baseline. This could be an instrument artifact, or it could be because the enclosure temperature rose 0.2 deg C during the heat pulse, and the heat from the enclosure is slowly removed after the pulse, stretching out recovery beyond second 13050. In any case, the total heat in the pulse above the baseline is 5395 joules. This is 87% of the heater input, a number which closely agrees with the steady-state recovery seen before the heat pulse. At second 16620, the lingering effects of the pulse have died out and the average recovery rate is again 87%.

We determined that an instrument artifact causes the flowmeter to fluctuate up to 5%. The flow rate is confirmed by collecting the returning cooling water in a graduated cylinder for three minutes. This test was performed repeatedly during calibration and electrolysis. On May 14 we confirmed that the flow was 74 ml in 3 minutes to within 1 ml, whereas according to the flow meter calibration factor we entered the previous day it registered 77 ml. The flowmeter readings gradually fell that day, returning to the correct level. Graduated cylinder readings are regarded as reliable, primary data with the flow meter as backup.

The Ragland triode cell is run using two power supplies, one for each anode. Both supplies are set to constant current mode, with one set to about two-thirds of the current of the other. Between the supply outputs and the cell is a changeover relay, which is programmed to have "supply A" first drive "anode 1" with "supply B" driving "anode 2" then after an interval of between a fraction of a second and around 16 seconds switching so that "A" drives "2" and "B" drives "1", switching back to original arrangement after the

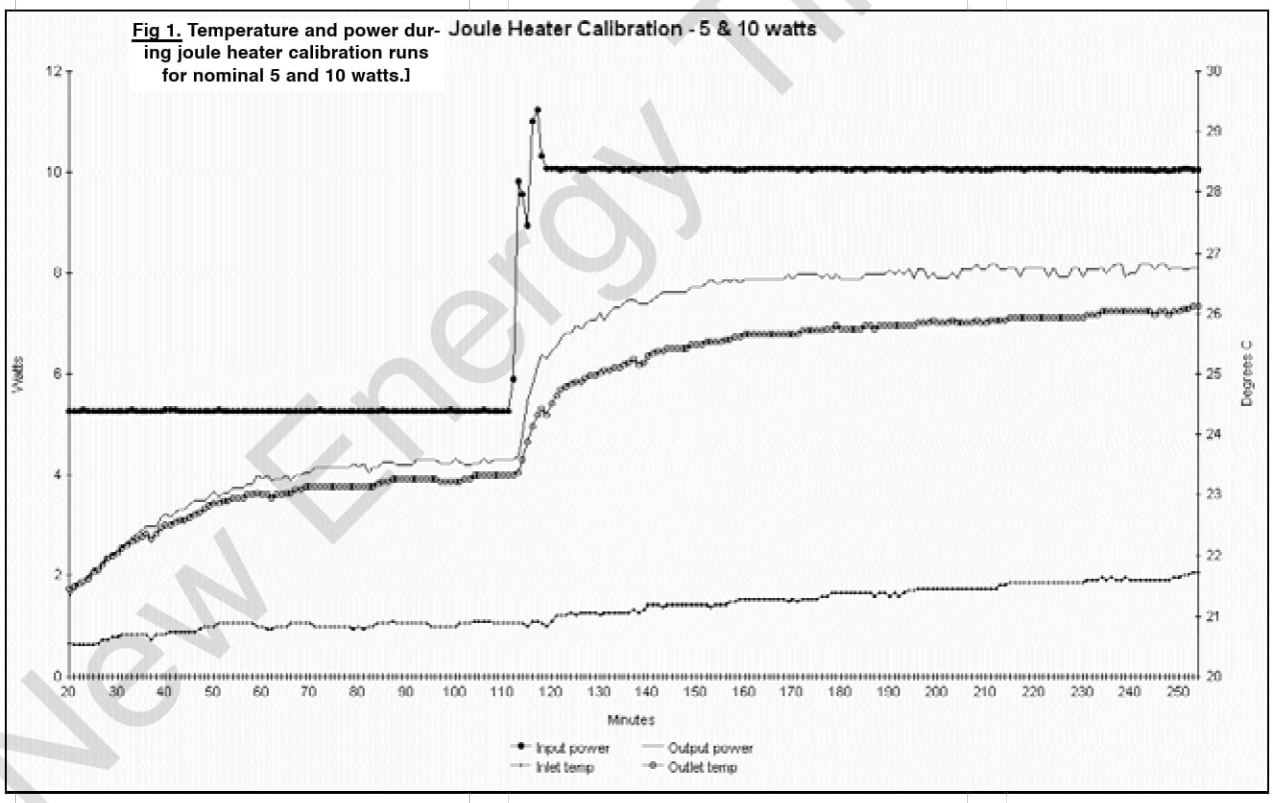
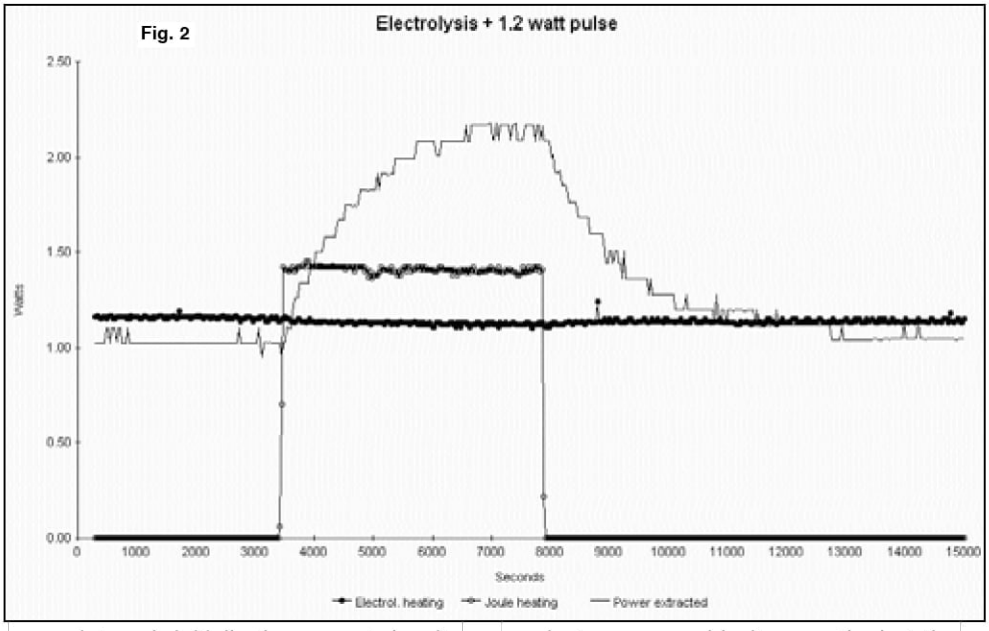
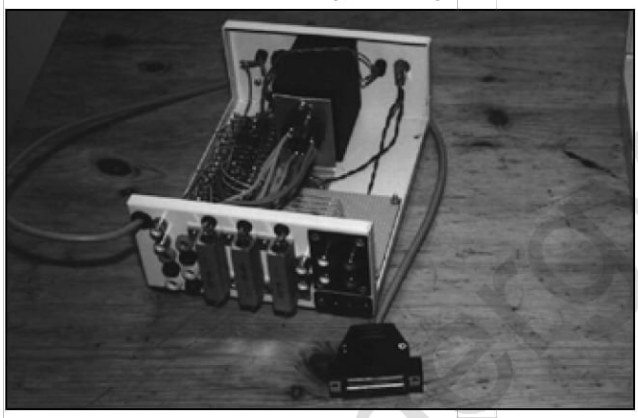


Fig 1. Temperature and power during joule heater calibration runs for nominal 5 and 10 watts.]

New Energy Times Archive



same interval. Initially the current density is quite low (around 100mA per square centimetre) and is increased in stages over a period of several days. At no time was excess heat seen or even suggested by the computer graphs. Various methods were used in an attempt to "shock" the device into activity. These included raising the anode currents considerably, and varying the switching rate.



Data acquisition system electronic interface.

It might be wondered why more precise calorimetry was not employed, as has been done by Scott Little in Austin, Texas (www.eden.com/~little). However, Ragland had reported power output : input ratios of as much as 3:1 (total input power), and very small excesses would not have served our purpose in testing these cells. Cost considerations and the mechanical design of the cell also rendered such improvements difficult.

We subsequently tested the second of the two cells, but this failed almost immediately after the test commenced. The cathode had become dislodged fom its mounting and was effectively short-circuiting against one anode. The cell was dismantled and an effort was made to re-assemble it correctly, but the following morning it was found that the voltage required to supply that anode with 150 or 250mA was only a few millivolts—suggesting that a further short-circuit of some kind had occurred. The test was abandoned. It should be appreciated that contamination of any kind must be avoided in a cold fusion cell, and we lack the proper facilities for working on the interior of a Ragland cell.

Conclusion

Our conclusion is that while we have not disproved the efficacy of the electrodiffusion technique used in these cells as a partial solution to the materials problem of palladium (it may even be that we had some very stubborn metal), the Ragland method is not a complete solution. The tests currently under way by Scott Little, using a similar but not identical cell with more precise calorimetry, have also shown no excess energy.

LETTERS Continued from 9

lar variables are encountered, essentially causality can be violated as much as desired for a period of time, then full restitution is made to "catch up" to the law in a single drastic change or "rebound." At least that is the theoretical case.

In the real system case, it seems to work just about as reported by Mr. Gray: For a period of time the device performs with a COP>1.0, then subsides back to below unity again.

As you pointed out in your commentary, there is a real need to find a way to condition the device exhibiting this phenomenon so that the relapse back to conventional operation of COP<1.0 does not occur.

Tom Bearden

Dear, Gene,

I very much enjoyed meeting you at the recent (4th) International Symposium on New Energy. I came away with the impression that there are few if any persons who possess more complete information on the CF revolution than do you. Your discussion with Stanley Meyer in the hall was memorable. I love to see promoters squirm when pressed to put their claims to the test. His insistent refusal to allow his device to be tested in your facilities tells me that it probably will not deliver on the promises he is making to the world and his investors.

Upon return home I read your magazine in detail and was further impressed. You are doing a difficult but important job in providing an objective data base relating to this most important area of endeavor. I have sent your magazine plus additional information obtained at the conference to Dr. K.V.K. Nehru in Hyderabad, India. He is the world's leading theoretician on the Reciprocal System and I believe that he will be able to supply us with some new directions in developing simple and repeatable CANF [Chemically Assisted Nuclear Fusion] experiments .

Living as I do in SLC, I witnessed first-hand the hatchet job Dr. [Michael] Salamon and others from our physics department [at the University of Utah] did on Pons and Fleischmann. I was not surprised though, having realized for many years that standard physics has more in common with religion than with science.

I would like to order two subscriptions to *Infinite Energy*, both beginning with Issue #12.

Rainer Huck, Ph.D.
International Society of Unified Science
Salt Lake City, Utah

We certainly appreciate your compliments and support. Yes, Stanley Meyer of Water Fuel Corporation really squirmed at the ISNE when I challenged him publicly to demonstrate the performance of his electrolytic process, so that we may learn once-and-for-all whether it is over-unity or not. To my knowledge, his system has ***NEVER*** *been put to a successful, independent, scientific test. Furthermore, his reluctance to publicize test results by an independent and widely circulated publication such as ours indicates to me that he fears what we would find. I just do not "buy" his line that he must "introduce full system technology" first, before letting anyone test his device.*

A general rule: Stay away from anyone who refuses to allow testing of a claimed over-unity device—especially when, like Meyer, they do not accept the fair proviso that you do not need to look into their "black box." Only input and output need be checked. —EFM

New Energy Times Archive

Smiting the wild SMOT.....

The Things We Get Up To....

by Christopher Tinsley

Playing with a supposed perpetual motion machine is not really what you might expect from the sober and dignified staff of this august journal, but that's just what we've been doing. And we are not the only ones, either.

It's a strange story. OK, the man who started all this will not like us calling his "Simple Magnetic Over-unity Toy" (SMOT) a perpetual motion machine, but that's what anyone else would call it. Essentially it is an old idea: a ball is persuaded by magnets on both sides of a ramp to roll up that ramp; it then falls off the end and rolls around to the start of the ramp and rolls up it — and so on and so forth.

I say it's an old idea, in fact it goes back into the 1200s:

"The device is based on the work on basic magnetism in 1269 of Pierre de Maricourt, commonly called Petrus Peregrinus.

"He owes his surname to the village of Maricourt, in Picardy, and the appellation Peregrinus, or Pilgrim, to his having visited the Holy Land as member of one the crusading expeditions of the time.

"...In the course of his work over the new motor, Peregrinus was gradually led to consider the more fascinating problem of perpetual motion itself with the result that he showed, at least diagrammatically, and to his own evident satisfaction, how a wheel might be driven round forever by the power of magnetic attraction."

(Ref doc.: The letter of Petrus Peregrinus "ON THE MAGNET, AD. 1269", translated by Brother Arnold, M.Sc. Principal of La Salle Institute, Troy, with introductory notice by Brother Potamian, D.Sc, professor of Physics in Manhattan College, New York). Information courtesy of Jean-Louis Naudin (France): Jnaudin509@aol.com. His web page, where more information about the SMOT may be found is:

http://members.aol.com/JNaudin509/

In fact, it seems that the general idea for the SMOT (and its reported *rotary* descendants) has surfaced time and again, and is the subject of at least one patent. So, our first question has to be how come it never seems to have resulted in anything real. Indeed, while following up this story we found a company in Sheffield in England, founded by Hannah Shaw and Son, where they have been selling magnets since 1784. Why in the past 213 years has nobody called in on Hannah (or her descendants), bought some of her magnets and astounded the world? And the second question has to be: why has any serious recent interest been taken in it?

Both questions have the same answers, and it's really a matter of which answer you prefer. One answer is that magnets can fool people into thinking something strange is happening, or that "there is another born every minute." The other answer is that there is a tiny but real effect, and that some people have seen it but been unable to show it to universal satisfaction or have succumbed to a Rothwellian "inventor's disease", and that it just needed someone (unaffected by that notorious ailment) to implement the idea neatly. I tend strongly toward the former answer, but I'm not absolutely certain yet.

....he said he had persuaded a ball-bearing to "roll around" a series of magnet ramps for several minutes, and had constructed a rotary version which had run for hours and even days.

The problem started when Greg Watson of Adelaide in Australia started talking about such machines on the email list vortex-l@eskimo.com. This didn't get much attention, and one member commented that he would prefer to hear no more of such devices until their inventor had "closed the loop". And soon afterwards Greg

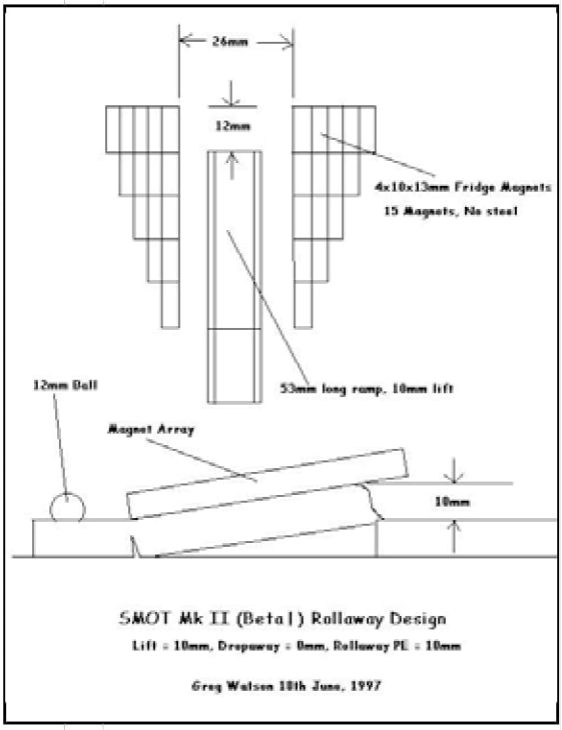
(gwatson@microtronics.com.au, http://www.microtronics.com.au/~gwatson)

announced that he had done just that —he said he had persuaded a ball-bearing to "roll around" a series of magnet ramps for several minutes, and had constructed a rotary version which had run for hours and even days. He said that in each case the device either had to be stopped, or it fell apart (as crude prototypes are prone to do).

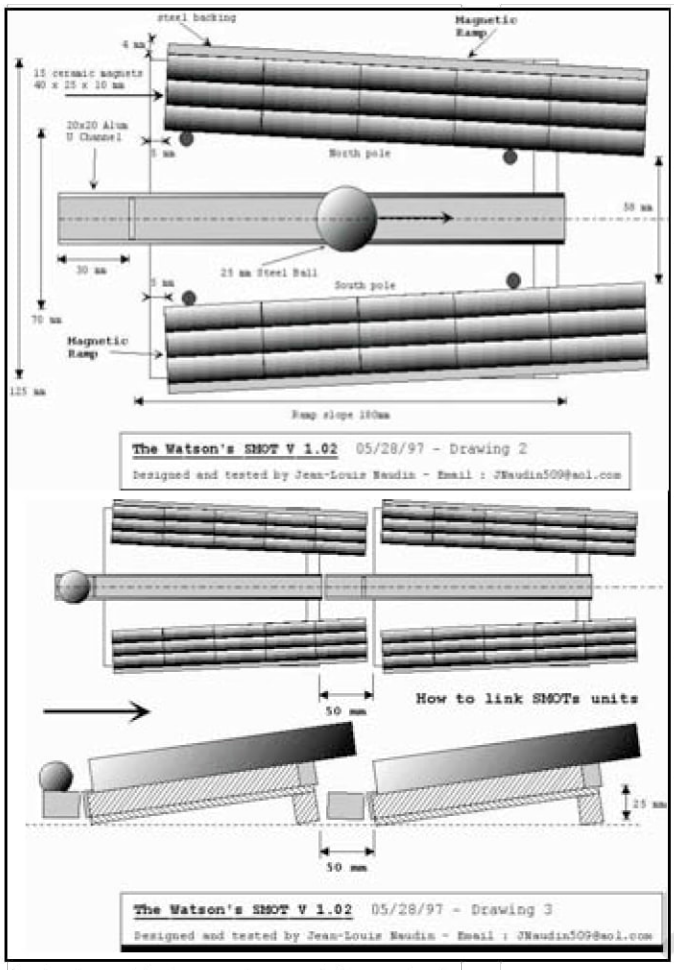
That would not have got people very excited either, but the problem was that Greg was more than willing to give full details of exactly how he had done the trick, he was willing to help anyone who was trying to copy him, and he was even prepared to sell kits for people to make their own SMOTs; he reserved details on the rotary version until his patent application was complete. He seemed unconcerned about dreams of infinite wealth, or about the Nobel prize - for which he probably wouldn't be eligible: did Wilbur and Orville get the Nobel? Detailed drawings were made available, and quite a few people (but not I) started work.

And some kinds of results started tocome in. Some claimed "level rollaways," where the ball exited a ramp at the same height at which it entered, but with definite energy of motion and with a clearly greater magnetic potential energy (it was in a lower strength field). Some even claimed rollaway at a *higher* than entry level, and at least one person claimed to have had a multiple roll-around through the starting point. Everyone found that Greg was right about a lot of things connected with this finicky little device, and eventually I was myself playing with magnets—perhaps I had not got that out of my system as a child, or perhaps I'm entering second childhood. Or it may even have been a reaction to doing calorimetry.

It has to be said that the results were



New Energy Times Archive



intriguing. Perhaps the weirdest single thing was the way several ramps could be linked into a chain, and the ball would roll slowly up one of them, fall off the end, roll up the next, fall off that one and roll up the next and finally fall off that one. But then we started to look a little more closely. We could easily persuade a ball to roll up one ramp and make its final exit to roll away a mere half-millimetre below its starting level, but we could never quite make it do that at the same level. It was surprising just how easily we could be fooled by that, because a half-millimetre over some tens of centimetres is just not as easy to check for as might be thought. We decided that the big problem was the comparing of losses: were the frictional losses and the eddy current dissipation in the ball as great as the potential energy loss of a half-millimetre fall? Then there was the question of magnetic potential energy. We decided that the only certain test was the roll-around. The best hypothesis I can find so far is that the combination of magnets and ramps gives what amounts in energy terms to a very slight but continuous downward slope, with the combined vector of magnetism and gravity acting always to pull the ball along into what is (but doesn't look like) a lower energy state. In other words, not a perpetual motion machine.

The counter-argument is that there *is* a real effect but that it needs the right kind of magnets and a very precise geometry. The only real evidence we have for that is Greg's testimony and the rather odd way in which the ball seems to be always on the edge of over-unity despite what may be quite serious eddy-current and frictional losses as the ball moves at speed up a ramp.

We were not the only ones to do a pretty rigorous attempt at reproducing the thing. Rick Monteverde (monteverde @worldnet.att.net) in Hawaii posted the following, which reflects our own experience exactly:

"I tried out a ramp tonight that I feel closely and adequately replicates the plan posted here by Greg Watson showing a 10mm single ramp rollaway SMOT. It doesn't work for me.

"The ramp I built is made from two profiles of 3mm acrylic and rises 10mm over about 60mm, with an approximately 2-3mm top drop-off radius curve, and about a 4mm bottom radius. It has 150mm or so of rollaway track at the same height as the starting section. The inner edge where the ball rides is sharp, clean and clear of file marks or other bumps and flaws, and is reasonably straight. The ball is a heat-treated 12mm steel bearing. Magnet array is a 1-2-3-4-5 of 1/4" x 3/8" x 3/4" #5 ceramics. The tracks are screwed to the side faces of two blocks of 12mm thick 'plastic granite' type (like Corian) countertop material, so the width of the track can be adjusted. By riding the ball low and raising the magnets up above the ball center as Greg suggested, I can get very nice slow climbs and silent drop-offs, as well as faster higher rides, and correspondingly more trouble and noise in the drop-offs. The heat treated ball responds smoothly and reliably, unlike the hard untreated balls. I had a very flat section of countertop to work on, with no tilt bias.

"This ramp is the quietest and smoothest I have built yet, and I was satisfied with the basic performance I got from it. This was not a lossy rig when adjusted well. It was quite convincing to see trials with different track widths, magnet widths and positions, fast, slow, high, low, narrow, wide, etc. etc. Sometimes the ball would roll out a bit from the bottom curve, but would never roll free. It would reverse course and get caught up in the fields again, often climbing back up over the very smooth drop-off contours. I would push the ball at that point where it would come to a stop before reversing itself on the bottom rail, and could still feel some magnetic resistance which felt significant. I could also give the ball a little extra push on startoff, and see a nice fake rollaway. The momentum from such a small push was preserved in the system well enough to show up properly at the other end. All in all, the setup duplicates well what I had seen earlier with both my half-meter track running flat without being tilted in ramp mode, and also the little shallow curve unit I built: once a steel ball checks in to the Magnetism Motel, it never checks out.

"I can't account for the reports of others getting clear rollaways. I'm quite convinced at this point that there is nothing to these things, unless Greg or someone can present a kit or other working model that clearly demonstrates the contrary. Until then, no more SMOTing for me. I'm still ready to believe it's possible, but will only jump over the fence on the basis of seeing evidence of a reliable design working in the hands of someone like Soo Seddon, Scott Little, Jed Rothwell, Gene Mallove, or others similarly experienced in doing science experiments of this level, and whom I trust are properly skeptical, objective, careful, and skilled enough to eliminate elements that could lead to false results. When you guys or anyone else has a kit from Greg and it works reliably, let us know, ok? Post a video maybe? I'll be in my garage, reverse engineering alien technology or something."

Yes, I agree with Rick. I was also rather disturbed that Greg in one posting was arguing that even a below-entry-level rollaway was over-unity! And yet ... I still can't be entirely comfortable. Greg has been so open and helpful, and he just posted something which touched a nerve:

"I have built the first 10 SMOT Mk2 kits (total orders are 19) and I am hand tuning them for best performance.

"I plan to link all 40 ramps in a straight line and a circle and do a Mpeg video. Will let you know when the data is posted.

"My RMOD [Greg's rotary version of this device] Mk2 design didn't work (RMOD Mk1.1 still works). Seems like gravity is somehow necessary. I will publish the full RMOD Mk2 details and test results on my

New Energy Times Archive

site soon.

"I am working on the design of a circular SMOT Mk3 ramp. I believe I have worked out a way to produce a simple and very low loss circular ramp and now to achieve and adjust the necessary magnetic fields. If I can get it to work, I will ship a working "Closed Loop" unit to all of the long suffering SMOT kit purchasers at MY cost."

The comment which intrigues me is the reference to the failure of one device to work, and the implication that gravity is an essential part of a working device. I suppose I just have this gut feeling that it would be—even though I do know that gut feelings aren't very rational! And if he admits failure on one thing, somehow it seems to make his claims of success with others more credible. Well, I just do not know what to think, but we have ordered two of these kits and perhaps we will be able to say more in our next issue.

LATE BREAKING NEWS:

From Greg Watson's Homepage—

SMOT Mk3 Plans (2nd Aug, 1997)

The SMOT Mk3 plans are being constantly updated.

Announcements of Major updates will be made to the Freenrg-l mail group.

In all SMOT ramps developed to date, the magnet arrays were built first and then the ramp was adjusted to best suit the arrays magnetic fields. While this approach has worked for many, I believe it is wrong and has been the major source of many SMOT failures for others.

In the development of the SMOT Mk3 single circular ramp, the ramp was designed first and THEN the necessary magnetic field profiles were adjusted to the ramp and the job it was required to do. This approach, which is probably the correct way to go, has resulted in a relative simple to build and adjust circular ramp.

The SMOT Mk2 single circular ramp is formed of flexible N gauge model railway track. The track is secured to a strong and stable circular ramp with a 8mm overall lift and an average length of 521.5mm. The ramp has an inside diameter of 150mm and an outside diameter of 182mm and an average diameter of 166mm. The ramp is 16mm wide, which is

the width of the 16mm wide sleepers of the N gauge track. The ramp has a lift of 1.53mm per 100mm of track. This is a very gentle ramp slope in comparison to the SMOT Mk1 & Smot Mk2 ramps. The steel ball is 12.5mm in diameter and is Chrome plated.

Unlike the SMOT Mk1 & SMOT Mk2 ramps where the ramp and the magnet arrays were parallel, the SMOT Mk3 magnet arrays are not. The SMOT Mk3 circular magnetic arrays have a 14mm differential between the bottom and top of the ramp. At the bottom, the centre line of the magnetic arrays are 2mm below the centre line of the steel ball and at the top, the centre line of the magnetic arrays are 4mm above the centre line of the steel ball. The magnetic arrays are not linear and for most of the array length, their centre line is 3mm above the steel ball's centre line. This above position assists the steel ball's rotation as it produces more attractive force on the top of the ball than the bottom. It also greatly reduces noise generating as there is less slip between the ball and the track.

The best results to date (2nd Aug, 1997) have been about 5 minutes of operation before the ball gets stuck at the exit point (either doesn't drop or gets sucked side ways). The average "Rollaround" time is just over 1 minute to date.

The ball will climb the ramp from most starting points (95%) on the circular ramps 521.5mm average length, but I start the "Ball Rolling" by gently pushing the ball off the top of the ramp.

I have built 2 SMOT Mk3 ramps to date. I am continuing the development of the 2nd unit to increase the stability of its operational characteristics and improve it "Rollaround" performance. I have found that exit guides (reducing the exit width to 13mm) help to reduce "Side Sticks," but I am still testing methods to eliminate exit hangs by experimenting with different exit radius curves. The exit is velocity sensitive as most SMOT builders know only too well. The original SMOT Mk3 units had sharp 90 deg top exits and 5mm bottom recovery curves like the SMOT Mk2 ramps.

I am currently working on a initial set of graphic plans. Should be up by 4th or 5th Aug, 1997.

Just to repeat by earlier statement on my SMOT Mk2 kits. ALL SMOT Mk2 kit purchasers will receive a SMOT Mk3 single circular ramp at No Extra Charge. When the SMOT Mk3 single circular ramp is stable and easy to manufacture,I will start shipping SMOT Mk3 kits in place of SMOT Mk2 kits.

Editor's Note: ***If there is anything to this astonishing affair, you can bet that Infinite Energy will continue to report the latest developments.—EFM***

ICCF-7
VANCOUVER
"The Best Ever!"

June, 1997

Ref: ICCF-7 in Vancouver April 1 9-24, 1998
To: All potential participants and attendees.
Sub: Voluntary call for preliminary abstracts

Hello:

I would like to thank everyone who took the time to respond to our February request for suggestions to improve the 7th International Conference on Cold Fusion (ICCF-7). Your input, support, and enthusiasm are greatly appreciated. We received over 50 completed questionnaires covering a wide range of useful opinions about how to improve ICCF-7. Most respondents supported the basic ICCF-7 format proposed in February regarding oral/poster schedules, evening workshops, and a different topical theme each day. The Local Organizing Committee (LOC) will try to incorporate as many other suggestions as possible, within the constraints of the established program format.

We are currently requesting voluntary, 1-2 paragraph abstracts from everyone who intends to give an oral or poster presentation, or help conduct a workshop at ICCF-7. You may submit more than one abstract at this time, and may change or refine your final subject matter later. Please submit your preliminary abstract(s) by e-mail, fax, or postal service to the address below. See the reverse side of this letter for further information.

The call for preliminary abstracts at this time will provide the LOC with an early indication of the variety and number of potential ICCF-7 presentations. LOC review of preliminary abstracts will help it to refine program schedules to better accommodate audience interests and anticipated scientific materials. The official call for full, one-page abstracts will be in September.

The ICCF-7 website should be activated by late summer to disseminate information regarding final program details, hotel accommodations, travel tips, and other important news (www.ICCF-7.org).

ICCF-7 is a unique opportunity for attracting new scientific and commercial participation to the emerging field of low energy induced nuclear reactions. We are adding new persons to our ICCF-7 mailing list every month, as general interest continues to build. ICCF-7 organizers continue to seek broader attendance and increased financial support for the conference.

Have a great summer!

Sincerely,
Fred Jaeger
Organizing Chairman

ICCF-7 c/o ENECO, 391-B CHIPETAWAY, SALT LAKE CITY, UTAH 84108 USA,
PH (801) 583-2000. Fx (801) 583-6245 • jaeger@ENECO-USA.com

GUIDELINES FOR VOLUNTARY & PRELIMINARY ABSTRACTS

The purpose of calling for voluntary abstracts at this time is solely to provide the ICCF-7 Local Organizing Committee (LOC) with an early planning tool regarding the number, variety, and subject matter of anticipated final abstracts in the fall. An early, informal sampling of abstracts at this time will allow the LOC to better organize itself to conduct evaluation of final abstracts to determine oral, poster, or workshop status, and to fine-tune the planned ICCF-7 program format. Your voluntary participation is greatly appreciated.

Continued, Next Page

Infinite Energy Archive

Corporate science life..... before SMOTs and calorimetry.....

Necessity Never Married Invention's Father

..... but then what would I know?

by "Soo" Seddon

Well.....I **did** once work in a commercial laboratory. OK, so I was just a Secretary, but in between bouts of intensive nail-buffing, I noticed a few things.

The company for which I worked held a monopoly in the "Super-Cooled Liquid" market. They also held lots and lots of licence agreements, via which they controlled the antics of other "SCL" manufacturers seeking to emulate their success.

The laboratory was the showpiece jewel in their corporate crown. They hired the smartest and the most eccentric.

Prima donnas like Dr "Cooling-my-heels-till-The-Cavendish-need-me-again" (they never did), who took exception to his sooper-dooper new department being labeled "Basic Science". It was hastily renamed "Advanced Science" in deference to his blood pressure.

My own Manager "PhD (Liverpool), like" ran the department responsible for all aspects of the SCL process. Everything from the gathering of raw materials to refining the finished product, utilising all manner of sophisticated analytical techniques along the way. Money was no object. The income from overseas licences had put them on the gravy train for life — or at least till the patents ran out — much too far in the future to worry about such trivial matters. This was 1976 and life was good.

They could afford to launch short-lived investigations into newly emerging "frivolous" technologies like fibre optics and harnessing solar energy. Even research into liquid crystal displays—then still in their infancy—were given bench space in the techno-nursery; and this, despite the remark I once minuted: that LCDs were "interesting" but would never catch on as the digits thus created were "impossible to see in the dark."

These were golden days, and everyone had fun: scope for creativity was boundless.

The Draughtsmen had a "Build a Better Kite" project which had fully occupied their weekend overtime shifts for the last ten years. An outright winner never being declared as, like all good engineers, they were constantly upgrading the design.

There were endless meetings, all of which began with the ritual complaining that there was never enough pink wafer biscuits with the afternoon tea, and ended with a Project Leader vehemently blaming lack of progress on "Lazy So-and-So", the Lab. Technician, who was absent through sickness so often that, on the rare occasion that said Technician actually worked a full week, the Project Leader had marked a "X" for "No Publicity" on his clock card.

Practical jokes were rife and invariably got out of hand. A simple soggy Kimwipe fight would accelerate to the vicious squirting of wash bottles and culminate in the most determined combatant poised for action atop a filing cabinet with a fire bucket full of water.

I confess the Secretaries were not above playing childish pranks. One of my treasured moments was when a couple of guys in the radiochemistry section became irritable with me for not giving priority to the production of their theses because I was concentrating, instead, on the work I was actually paid to do. I seem to recall the word "inefficient" being mumbled (from halfway down the corridor, of course), but I heard it and was, therefore, honour-bound to retaliate.

The lawyers worked double shifts on that one. They behaved much like Jed Rothwell's miser, "huddled protectively over a chest full of gold as he starved to death".

I arrived in work very early the next day and borrowed the radiation badges from their labcoats which, with the aid of a Technician friend of mine, were then exposed to a rather unhealthy dose of X-rays. There was certainly nothing inefficient in the way those radiochemists rapidly hoofed it across the lawn an hour or so later.

But I digress. The fact is, this Au-age was destined for self-destruction. It's all very well squandering the spoils of an earth-shattering invention—while they last—but it's necessary to be just a little forward-thinking, even when you're quids in.

I recall sitting in on many paranoia-filled meetings, where patent applications lodged by The Competition were microscopically examined for the teeniest infringement. One of the more serious encroachments was when The Competition patented a formula which varied only from the Sacred Batch in that they had added 0.0001% more antimony oxide. The lawyers worked double shifts on that one. They behaved much like Jed Rothwell's miser, "huddled protectively over a chest full of gold as he starved to death".

The end was slow in coming. One by one the coveted patents expired and there was very little with which to plug the gap. As the gilt-edged revenue dwindled, jobs were lost. Departmental re-organisations became a weekly event and there was an "on-going downsizing situation" which, first of all, relied on natural wastage; but, pretty soon, financial incentives were offered to help trim down staffing levels.

The final hammer blow—the dramatic reduction in expense allowances—naturally heralded the start of the Brain Drain.

I can't recall ever typing out so many job application forms and CVs. Many members of the scientific establishment, whose projects had been curtailed or drastically scaled down, defected to The Competition, who welcomed them with open arms and large budgets. I also never typed so many Non-Disclosure Agreements to be signed in blood by these fleeing traitors. Then I left, so I missed the final death throes. Many jobs were lost throughout the whole company.

The lab is still there, but with only about one fifth of its former establishment level. The Competition have now taken over a whole sector of the company's UK operation, and appear to be thriving.

I often wondered what became of my former boss and the rest of the guys, almost all of whom left before the ship sank, until recently when a friend— a security officer at the lab—told me that "PhD (Liverpool), Like" had returned to the fold and now held a "very senior post up on the 5th floor."

I was impressed ..... it was a four-story building.

ICCF-7, Continued from page 51

1) All abstracts shall be in English.
2) Selection of iCCF-7 oral, poster, or workshop presentations will be based only on final, full abstracts that are to be submitted this autumn, NOT on preliminary abstracts submitted under this request.
3) Preliminary abstracts should be no more than 1-2 paragraphs long (not to exceed one typed page), and provide only a general description of a planned topic.
4) Each abstract shall cover only one topic, but you may submit more than one abstract.
5) Do not submit confidential, proprietary, or copyrighted material.
6) Preliminary abstracts do not commit or restrict your choice of final subject matter in the fall. You can alter or completely change the subject matter of your final abstract in September.
7) All final abstracts will be uniformly evaluated based on originality, rigor, variety, and relevance to the overall ICCF-7 program format.
8) Preliminary abstracts may be submitted by e-mail, fax, or regular post.

New Energy Times Archive

ICCF-7 News
Vancouver, Canada April 19-24, 1998

Letter received from the ICCF-7 organizing committee:

February 7, 1997

Greetings,

Welcome to beautiful Vancouver, Canada's gateway city to the Pacific and the conference site for the 7th International Conference on Cold Fusion (ICCF-7).

I would like to invite you, your colleagues, and your spouse or partner to attend the conference on April 19-24, 1998. ICCF-7 will take place in Vancouver's waterfront Convention & Trade Centre which is pictured in the foreground on the cover of the enclosed brochure. Vancouver is a safe, clean city where the snowcapped Canadian Rocky Mountains meet the clear blue Pacific Ocean.

The exciting field of low energy induced nuclear reactions in solids has continued to mature, and many new, compelling scientific findings are becoming known. The ICCF conference series provides a unique forum for direct interaction with top scientists from around the world. The diversity and quality of on-going research and its commercial implications make ICCF-7 an important event that should not be missed.

Enclosed is a three page ICCF-7 Preview, a Vancouver information brochure, and a questionnaire form. Please return your completed questionnaire by March 1st, 1997. Wherever possible, we will incorporate your input into the Vancouver program. The ICCF conferences are organized solely to benefit you, the participant, so be sure to give us feedback on your preferences.

With your input and support, ICCF-7 will truly be *"The Best Ever!"*

Sincerely, Fred Jaeger
Organizing Host for ICCF-7

c/o ENECO, 391-B Chipeta Way, Salt Lake City, UT 84108; PH:(801) 583-2000; Fax: (801) 583-6245; jaeger@ENECO-USA.com

Excerpts from the ICCF-7 mailing:

SCIENTIFIC PROGRAM

Selection rules and evaluation criteria for papers will be sent to all potential presenters beginning with the June '97 call for abstracts. The final announcement of oral and poster categories will be sent by December 15, 1997.

The LOC (Local Organizing Committee) will adopt a standard set of published guidelines for objective evaluation of all papers. A different topic is planned for each day at ICCF-7. It is proposed that an invited presentation with summary review or global implications for the entire field begin each day's topic. Following the opening session, five 20-minute oral presentations are proposed that meet specific criteria for the best individual work based on rigor, quality, uniqueness, innovation, and clarity of English language presentation. Afternoons will be entirely devoted to enhanced poster sessions, which include a 3-5 minute oral preview and summary.

Something new? ... Have all ICCF-7 participants drop a name in a box at Wednesday eve's banquet to vote for the ten posters with the highest interest. Each of the "Top Ten" poster presenters selected will conduct a 15 minute expanded oral presentation to the full audience Thursday afternoon.

Something different? ... Official concluding ceremonies will take place at a Friday morning brunch. Events could include a mix of formally prepared scientific conclusions and an informal discussion session. The informal session would permit and encourage a wide cross-section of audience members to voluntarily present their own 3-5 minute impromptu talk about "What ICCF-7 meant to me"; or "What was the most interesting presentation to me and why"; or "Where I think we should go from here and why"; etc.

Something late? ... Evening educational workshops that present recommended experimental techniques to properly measure heat, helium, and low-level nuclear events are proposed.

Program Summary: 4 Invited Presentations, 20 Oral Presentations, 10 extended oral presentations of posters, 150-180 poster presentations, three evening workshops, and a half-day closing ceremony.

Other information:

The ICCF-7 venue is a government owned Trade & Convention Center on the waterfront in the heart of downtown. Ballrooms have been rented that hold between 225-450 persons in classroom seating, with expansion capability to 1,100 persons. An estimated $450 USD per person conference fee would include the Sunday eve reception, all sessions and publications, Wednesday eve entertainment & banquet, four lunches, mid-morning and afternoon refreshments, and Friday morning brunch. Some 415 hotel rooms in five Vancouver hotels have been blocked at special conference rates: Pan Pacific, Waterfront, Hyatt, Renaissance, and Day's Inn.

With maturation of the field, ICCF-7 seeks to attract a more diverse audience: additional scientists, research institutes, students, national funding agencies, commercial interests, journalists, and spouses.

ICCF-7 VANCOUVER "The Best Ever!"

CALENDAR

1st Low-Energy Transmutation Meeting
At Texas A&M University
June 19, 1995

The 2nd World Hydrogen Summit
September 28
-October 1, 1995
Montreal, Quebec, Canada

16th Symposium on Fusion Engineering (SOFE '95), *with cold fusion component!*
October 1-5, 1995
Champaign, Illinois

Third Russian Conference on Cold Fusion and Nuclear Transmutation
October 1—8, 1995
Sochi, Russia

Power-Gen '95
(CETI cell demo)
Anaheim, California
December 5-7, 1995

New Ideas in Natural Sciences
June 17-22
St. Petersburg, Russia

1996 International World Energy System Conference
June 19-21, 1996
Toronto, Canada

2nd Low-Energy Transmutation Meeting
College Station, Texas
Sept.13-14, 1996

ICCF6—Sixth International Conference on Cold Fusion
October 13-18, 1996
Hokkaido, Japan

Building Energy—Insuring a Sustainable Future
March 12-15, 1996
(Sponsor: Northeast Sustainable Energy Association)
Radisson Hotel and Conf. Center
Cromwell, Connecticut

INTERNATIONAL SYMPOSIUM ON NEW ENERGY
(Sponsor: Academy for New Energy)
May 23-26, 1997
Denver, Colorado

ICCF7—Seventh International Conference on Cold Fusion
April 19-24, 1998
Vancouver, CANADA

New Energy Times Archive

Available NOW!!!

Leading Edge Technology

RED HOT!

- Incredible 21st Century ENERGY technology...
- Alternative MEDICINE... Doctors Know the Reality... Now YOU can too!
- Amazing HEALTH Products... A Great Consumer Guide!

Send check or money order to:

Exotic Research
PO Box 5382
Security, CO 80931

call (800) 446-3465

or FAX (719) 477-0594

Annual Membership Rates
US: $30 Canada: $35 Others: $55

Theory and Experiments

ANTIGRAVITY ON A DISK

Contains over 1 megabyte of information in 12 chapters, 20 illustrations, one "sound bite," and two animations.

Only $14.95

The information is presented in a manner that is accessible to the novice, yet is thorough enough to please the most advanced investigator.

- **Discover how Edward P. Tryon's theory about the genesis of the universe may be used to produce new energy.**
- **Learn about the far-reaching ideas of Harold E. Puthoff.**
- **See and hear Frank J. Stenger's ball lightning machine.**
- **Explore Jan Pajak's magnocraft.**
- **View a plasma ball in a microwave cavity.**
- **Discover the error in the "Copenhagen interpretation" of quantum mechanics.**

Requires Windows and a 386 or higher processor (Copyright 1995)

The author, Frank Znidarsic, has a B.S. in Electrical Engineering from the University of Pittsburgh, has an Associate in Science from Saint Francis College, and is a registered professional engineer in the state of Pennsylvania.

To order— send $14.95 payment to:
Cold Fusion Technology, P.O. Box 2816
Concord, NH 03302-2816

Four (4) two-hour VHS video tapes—**8 hours total viewing**— are available as a set, or individually. These were only slightly edited from professionally taken video footage of the day-long Cold Fusion session at MIT on January 21, 1995. The tapes include the following material:

TAPE#1

Dr. Eugene F. Mallove
(Cold Fusion Technology, Concord, NH)
"Cold Fusion and New Energy Technology - An Overview"

Dr. Peter Graneau
(Northeastern University Center for Electromagnetic Research) "Anomalous Forces in Water Plasma Explosions"

TAPE#2

Buford ("Ray") Conley
(MIT, graduate student, Dept. of Aero/Astro Eng.)
"Light Water Excess Heat Experiments"

Fred Jaeger
(ENECO, Salt Lake City)
"Patents and Commercialization"

Professor Peter L. Hagelstein
(MIT Dept. of Electrical Engineering and Computer Science) "Cold Fusion: What We Know and What We Don't Know"

TAPE#3

Professor Peter Hagelstein
(CONTINUED from TAPE #2)
"Cold Fusion: What We Know and What We Don't Know"

Professor Keith Johnson
(MIT Dept. of Materials Science and Engineering)
"Progress in the Theory of Excess Heat" *and Excess Heat*- The Movie, now being made by Hollywood!

James L. Griggs
(Hydro Dynamics, Inc., Rome, Georgia, USA)
"The Hydrosonic Pump: Excess Power and Other Effects"

TAPE#4

Bertil Werjefelt
(PolyTech(USA), Hawaii)
"Energy from Magnetic Materials and Magnetic Fields"

Dr. Eugene F. Mallove
(Cold Fusion Technology, Concord, NH)
Concluding Remarks

The tapes include the speakers' presentations as well as question and answer sessions. There is footage of the Hydrosonic Pump under test as well as close-up footage of rotor surface melting effects. Bertil Werjefelt shows footage of experiments in his own laboratory. There are scenes of Japanese researchers from Sumitomo, Hitachi, and other companies and universities now involved in their claimed extraction of energy from magnetic materials. These efforts are now said by these researchers to be proceeding toward commercialization. Actual experiments are seen in progress. The tapes are VHS cassettes in NTSC format and range from 120 to 127 minutes each.

To order **the full set of four, two-hour tapes**, please send check or money order to Cold Fusion Technology for **$79.95 plus $5.00 shipping and packing, within U.S. and Canada.** [For other foreign orders, please replace the $5.00 shipping fee with $30.00 for air shipment.] To order *individual tapes*, please specify which tape(s). Please send check or money order for $25.00/tape, plus $3.00 shipping and packing if only one tape, or $5.00 total if more than one tape. Tapes are Copyright 1995, Cold Fusion Technology.

Please send tape payments to:
Cold Fusion Technology
P.O. Box 2816,
Concord, NH 03302-2816
Fax: 603-224-5975,
Phone: 603-228-4516.

For an Excellent Introduction to Cold Fusion and New Energy Technology.....

ORDER THE ACCLAIMED VIDEO TAPE SET OF

MIT COLD FUSION DAY- January 21, 1995

at the Massachusetts Institute of Technology

Electric Spacecraft Journal Network

Keeping you informed about independent research.....

The ESJ Network assists individual research efforts, facilitates cooperation among experimenters and provides an open forum for the exchange of information an ideas. The Network provides a medium for direct interaction among associates. We urge individuals doing independent research to network.

The Network welcomes those engaged in experiments, analysis, conceptual thinking, and investigative research, who are willing to interact with others. Inquiries to: 704-683-0313 or 704-683-1280, Fax: 704-683-3511

Subscriptions to the quarterly *Electric Spacecraft Journal*, 73 Sunlight Drive, Leicester, NC 28748 USA.
Annual Subscription rates: U.S.A. $24; Canada and Mexico $29; Overseas $39.

New Energy Times Archive

Subscibe Now To...

ELECTRIFYING TIMES

International coverage of:

- **Electric Racing Events**
- **New Propulsion Technology**
- **Over Unity-Antigravity**
- **Latest Battery Technology**
- **Company Profiles**

3 Issues per year for only $10
-Affordable Advertising-
63600 Deschutes Road
Bend, OR 97701
Phone: 503-388-1908
Fax: 360-693-4408

1996 Cold Fusion & New Energy Symposium (at the Cambridge Marriott, 1/20/96)

VIDEO TAPES (7 hours of *ESSENTIAL* viewing!)

On the four VHS tapes.....

- **Dr. Eugene F. Mallove**
- **Jed Rothwell**
- **Dr. Mitchell Swartz**
- **Dr. Dennis Cravens**
- **Dr. James Patterson**
- **James Griggs**
- **Hal Fox**
- **Prof. Keith Johnson**
- **Chris Tinsley**
- **Dr. Paul LaViolette**
- **Dr. Hal Puthoff**
- **Japanese Magnetic Motor Researchers**

You must order these tapes ..... *if you want the best up-to-date overview of cold fusion and new energy by leading researchers and people in the know*, including views of the **Power-Gen '95 CETI Patterson Power Cell** demo equipment, magnetic motors, video clips of the "Cincinnati Group's" experiments, operation of the **Hydrosonic Pump™**, video footage of **Yusmar** devices in Moldova, etc., etc.

ONLY $99.95 (U.S. & Canada)
($124.95, other foreign, includes air-mailing)
Send Payment or Credit Card Info to:
Cold Fusion Technology
P.O. Box 2816
Concord, NH 03302-2816
FAX: 603-224-5975

Do it—please! Write a letter about cold fusion and new energy to your Congressman, Senator, President, Vice President favorite Candidate, or Prime Minister.

Then send it to us!

O.K.?

SHOW YOUR COLORS...(Red, White, and Blue) and Spread the Message.... Get Your *Infinite Energy* Cold Fusion Vinyl Bumper Sticker(s) Today!

Actual Size: 3 in. x 12 in. (7.6 cm x 30.5 cm)

	U.S. and Canada	Other Foreign
1 Sticker	$5.00	$6.00
5 Stickers	$20.00	$24.00

(Please call for quote on larger orders.)

Order from: **Cold Fusion Technology, P.O. Box 2816, Concord, NH 03302-2816**

COLD FUSION ∞

***Infinite Energy* NOW!**

GET THE FACTS: INFINITE ENERGY MAGAZINE, P.O. BOX 2816, CONCORD, NH 03302 — USA

New Energy Times Archive

"ON THE ROPES" - British Broadcasting Corp. Radio 4
Thursday, May 22, 1997
Professor Martin Fleischmann Interviewed by John Humphrys

John Humphrys (JH):
Imagine a world in which limitless energy could be created from a few buckets of water—so cheap they wouldn't even bother to meter it. We would solve the crisis of global pollution at a stroke, no more need to pump carbon dioxide into our battered atmosphere. We might even end global hunger. The waters of the ocean could be desalinated in vast quantities and pumped wherever it was needed to turn deserts into green fields. Oh, Brave New World indeed.

On March 23rd 1989, it seemed that we had taken a great step towards that. Two hugely respected scientists, Martin Fleischmann and Stanley Pons, held a news conference at the University of Utah to announce that they had discovered the secret of nuclear fusion—the Holy Grail of science. The process by which the stars in the very heavens produce their power.

For a few heady days, the world celebrated the great news and dreamed wonderful dreams, then for six nail-biting months, scientists the world over settled down to reproduce the experiment and they failed—or *said* they failed. From that moment on, Fleischmann and Pons were truly "on the ropes."

Professor Fleischmann, was that how it felt at the time for you? Did you feel beleaguered at that point?

Martin Fleischmann (MF):
I thought it had gone wrong. I thought the whole scientific process, in as much as it affected this particular research, had gone wrong, that's certainly true. Quite early on the opinions were polarised into groups who behaved as sceptics. As they said: "We are sceptics and true believers." So, the essential process of criticism was replaced by scepticism and that derailed research.

JH: We'll come to that in more detail, but let's...for those of us who, like me, are not scientists, let's try and understand a bit about this cold fusion. I know it's a phrase that you don't particularly like, but we have split the atom and we have created nuclear fission. OK, in layman's terms we have understood how to do that and we have, therefore, liberated vast energy, but it's an explosion. We can contain it in nuclear power stations but, in the process, we produce a massive amount or, at least, potentially of pollution and risk and so on. It's very expensive to do and we can't exactly use that to put it in our vacuum cleaners to power them as we once dreamed that we would.

Now cold fusion—to use that phrase for the moment—is something quite different from that. It's joining the atoms together is it?

MF: Joining the nuclei together. If we break nuclei which are heavier than iron into fragments, we get energy. If we join nuclei together which are lighter than iron, we gain energy again. And, of course, one of the chief objectives of fusion research is to join nuclei related to hydrogen, heavier nuclei than hydrogen—tritium, which contains two neutrons and one proton, or deuterium, which contains one neutron and one proton—in order to create heavier elements. That is fusion.

JH: And the effect of doing that is to release enormous amounts of energy...

MF: Like in the Sun. The same type of process as the initial steps in the Sun.

JH: And the only way previously, that we had discovered how to do that involved huge temperatures.

MF: Correct.

JH: Like the Sun.

MF: Yes. Huge temperatures or huge energies and one thing, going back to your lead-in, it is absolutely certain that the long term future of the world requires the implementation of fusion. Now we did not actually say we had achieved fusion. We said we had created large amounts of energy which could not be explained by chemistry.

JH: Right, you had — again, to put it very simply — you had a flask, a glass bottle, you had tubes sticking into that bottle, you had water in the bottle and what did you do?

MF: Electrolyse the palladium electrode and—people know what an electrode is, I think, they are used to having batteries....

JH: Right, I can grasp an electrode.

MF: You can grasp an electrode....you polarise it negatively, cram deuterium into the lattice and you get excess energy.

JH: And that is what you did. It sounds very very simple indeed. You put in a certain amount of energy and you created much more energy. Four to ten times as much.

MF: Well, under certain circumstances, let's be quite correct about this. Under some transient conditions, about ten times as much energy out as we had put in.

JH: Now all of this was being done in secret.

MF: Indeed.

JH: Why?

MF: We did not like certain trends in research which we could perceive internationally.

JH: That is you and Stanley Pons?

MF: Yes, and we did this really to satisfy ourselves whether or not carrying out these processes might have unfortunate consequences.

JH: Unfortunate, in what sense?

MF: Well, I think I have to come clean here. In the sense of national security really.

JH: Why?

MF: Well, I mean the real reason we did this was because we thought that this might be one way of inducing nuclear reactions which would be useful in a military context.

JH: And you were worried about that. You did not want to enable that to happen?

MF: Well, if the answer to that was yes, we would have wanted the information classified. At least classified for the time being until the scope of the whole problem had been properly investigated.

JH: Something that puzzles me about this is that you had put a lot of your own money into this, a hundred thousand pounds.

MF: Well, we knew we couldn't fund it and couldn't write a research application.

JH: Why?

MF: It would not have been funded. First of all, it would not have been funded and, secondly, we did not want to reveal that we had the notion that we might carry out these processes in this particular way.

JH: Your critics have since said that the reason for that was because you wanted to get ahead in this race because, after all, if we do...

MF: There was no race.

JH: No race?

MF: No, there was no race.

JH: But we are talking here about what some would describe as, I think I said, the

New Energy Times Archive

Holy Grail of science indeed.

MF: Oh well yes, but nobody else was working....at least we believed that nobody else was working in that particular way.

JH: Somebody described you, one of your erstwhile colleagues, didn't he, as a "brilliant scientist with a mad theory," and is that the truth of it?

MF: No, the theory isn't mad at all. The theory is....if you put down the framework in which you carry out investigation, then this is not at all a mad concept. Many scientists might regard it as being mad, because they judge it within the existing paradigm, but if you....I am quite convinced that the paradigm will change, it should have changed in the latter half of this century but I think the paradigm will change, then it will be seen that this particular research was just an example of many other research topics and might very well lead to a positive conclusion. It doesn't follow that every piece of research set up within a new paradigm will be successful.

JH: No, of course, but you believed, you conducted, you carried out this research, you conducted those experiments and, on March 23rd 1989, you held a news conference to tell the world that you had succeeded. Now, let me just take you back to the moment of the experiment, and I doubt very much, because we all imagine the professor in the laboratory saying the equivalent of "Eureka, we've cracked it." I suppose it wasn't quite like that, you didn't rush out of the laboratory saying: "My God, we've done it! We've done it! We've done it!"

MF: No, no. Science isn't like that. Eventually we will deposit our papers in a library somewhere and you will see that the usual comment was: "The results are frustratingly interesting, there is no reason to stop." Perhaps no reason to go on, but then you see it depends on the sort of person you are. Many people, when they get an unusual result will say: "This is unusual, I'll go and do something else." If you are a different sort of person you will say: "Should I stop, or should I go on?." It depends on your attitude to the unusual result, and I was brought up in the research school where you always had to explain everything you did, including the unsuccessful experiments.

JH: But what you did, is you held a news conference. Instead of publishing the results of your research in *Nature* or some other respected journal, scientific journal, for your colleagues to pore over and, eventually perhaps, somebody would say: "Yes, we think there's some rather interesting work here." You held a news conference and the world went potty.

MF: Well, that was something outside our control. By that stage, we lost control. Another research group was working on this topic and they believed that they had observed neutrons of the correct energy.

JH: There was a race.

MF: Well, it wasn't a race really. I think the other group should have followed our wishes and held back the publication till September 1990. Their work would have been better, on a better basis, and our work would have been on a better basis. But when it became clear that this other research group wanted to publish their findings we, of course, then had to inform the University authorities of what we were doing and we had to ask them the question: "Do you believe that you need to take a patent?"

JH: And it was their decision?

It was the 50th anniversary of the discovery of nuclear fission and the hot fusion brigade were just gearing themselves up for asking for a lot more money for the next step in the research into hot fusion.

MF: It was their decision, not our decision. It was the University's decision that there had to be a set of patents and that then dictated the subsequent events.

JH: The news conference.

MF: That's right. The news conference was a consequence of the patent applications.

JH: And you regret that that happened?

MF: Well, I was never in favour of it. I tried to stop the news conference even the day before but unsuccessfully.

JH: Because the result of that....

MF: I knew it would go bad.

JH: And it did go bad.

MF: Yes. I knew it was not a sensible thing to do.

JH: And the result of that was that it exposed, I suppose, apart from anything else, all the jealousies that operate in the scientific world.

MF: Well, there were plenty of jealousies. It was a singularly unfortunate time to make the announcement. It was the 50th anniversary of the discovery of nuclear fission and the hot fusion brigade were just gearing themselves up for asking for a lot more money for the next step in the research into hot fusion. So it was a singularly unfortunate time for two chemists to make such an announcement, that was certainly true. And, of course, if we had not been put into that situation in March 1989, if we could have delayed—even to December 1989—we would then have published the full paper rather than a preliminary paper. And I thought, my recommendation was, that this should be let out at the lowest possible level. In fact....

JH: Without a great fuss, you mean?

MF: Yes. I wanted to have it published in the *Annals of Utah Science* of which, I believe, they only print seven copies.

JH: Not a best seller exactly.

MF: Not a best seller. I wanted to really let it out in a very very minor way.

JH: There seems to be a great deal of difference between chemists and physicists that I had not been aware of.

MF: Yes, yes. Well the joke statement is that, the reason for the news conference was, "chemists are interested in chemicals but physicists are not interested in physicals." But, I think that is only partly true. When a lot is at stake, then physicists are really the principal offenders with regard to making premature announcements.

JH: So what followed then was a result, in your view, partly of professional jealousies.

MF: It's very difficult. I always maintain that really this is a job for several investigative journalists to find out what really went on. It was very unfortunate. I thought it would be bad, but I didn't think it would be quite that bad. I was hoping that we would have constructive criticism, rather than scepticism.

MF: But it was not to be, we had scepticism and no criticism.

JH: I was going to say, you had both didn't you?

MF: No. There was no criticism, there was no constructive criticism at all really. I am not aware of anybody who asked for our results and who analysed our results. We had to ask for the results to be analysed independently.

JH: Some people went as far as suggesting that you'd been guilty of some sort of fraud.

MF: Well, you know this, I always say "Methinks the lady doth protest too much." People who accuse other people of fraud, you should then always say, Well, perhaps they have done a little bit of fiddling somewhere. ***[Editor's Note: A not-too-subtle reference to anti-cold fusion events at MIT in 1989.—EFM]***

JH: Why? Again, looking at this as a non-scientific outsider. Why should there be

New Energy Times Archive

this sort of thing going on in this world?

MF: It's distressing, I don't know. A precondition for science is total honesty. Of course, I know scientists deviate from this, you know. Even highly respected scientists try to make their results conform to some notion they have had and, later on it turns out that the notion was incorrect and if the new experiments are carried out, you find it is really somewhat different to the way they believed.

JH: But isn't the most simple explanation of all of this, that you got it wrong?

MF: Well, I keep on checking. You see I must tell you that I am again checking up old data. You always worry about that, I don't know how often I have been through the past data to try and see, "Where have I made a mistake?" This is something you must do. You see, I do believe with Sir Karl Popper that you can't prove something right, you can only prove it wrong, so one of the things you have to do is check and check and check and check. Have you made a mistake? Where is the mistake? If you can't find a mistake then all you can say at the end is "I have done the following investigation, I cannot find a mistake" and then you have to stop there.

The consequence of that is that you could go on and maybe create a successful energy source and I have always said that the only thing which people will believe in the end is a practicable device, so this research would have an end result and I am convinced that nobody will believe any of the research results until there is a device.

It's like the Wright Brothers flying their aeroplane. Nobody believed that a heavier than air machine could fly until they saw the plane flying. In fact, the day before the *New York Times*, I think it was, accused them of fraud.

JH: What happened was that one team of scientists after another tried to reproduce the results, including the people here at Harwell, and failed. So, therefore, after all this excitement the conclusion was the whole thing, was a nonsense.

MF: No, but you see, the problem is—let's take the group at Harwell—the apparatus used at Harwell was deficient in many regards. You have to design the experiment and then you have to analyse the results and this problem of analysing the results is where most of the failures in science take place.

JH: This is puzzling again, to a non-scientist like me. This is puzzling. What's going on here? Why if you can do it, and you can take that set of results and analyse them in a certain way, those of us who aren't scientists have always believed that the one thing you can be absolute about is science. Alright, philosophy, poetry, music, Heaven knows what any of it means, there are a million interpretations, but a scientific result, we've always wanted to believe, at any rate, is a result, is a certainty.

MF: Well exactly. But you have to carry out the analysis. And if you cannot analyse your data you may have to change your experiment so that you can carry out the analysis. I'm afraid scientists are not very good at analysing data. I always say to people who don't believe this, write a research application which is going to deal strictly with the analysis of other people's data and see whether you get any funds. You will never get the funds, and you see research is driven by the Research Student Syndrome, where the Supervisor (I can only speak for University research though) a Research Supervisor has to get the maximum number of results and says "I will analyse those data later," but of course, he never analyses those data.

People who accuse other people of fraud, you should then always say, Well, perhaps they have done a little bit of fiddling somewhere.

JH: Because he wants to carry on researching?

MF: That's right. I mean, the biggest loss of information in science is the lack of analysis of existing data.

I have always said that the only thing which people will believe in the end is a practicable device, so this research would have an end result and I am convinced that nobody will believe any of the research results until there is a device.

JH: You are not saying, Professor Fleischmann, are you that you are the only one who is right about it, the rest of the army is out of step?

MF: No, there are plenty of people out there. I mean, this has all been published. It's all accessible. We don't need to talk about this any more, if people really wish to know what these research groups obtained, it is in the literature.

JH: Of course, we wouldn't be able to understand a word of it, that's the problem.

MF: Well, you see, this is always the way. I think the problem is that science sometimes proceeds very slowly because of the misinterpretation of results.

JH: Well, alright then, let's...in nice, simple terms....you conducted the experiment, you got, as you put it, excess heat. The world got very excited about that. Other scientists tried and failed to reproduce the experiment and—adding on the very important caveat—to analyse the results in such a way that they came up with the same thing as you.

MF: No, no, let me correct you. They just did not analyse their results.

JH: OK, didn't analyse the results.

MF: Therefore their experiment is useless.

JH: But, we are talking here, about as important a piece of scientific work as it is possible to imagine, certainly in layman's terms, in anybody's terms for that matter, and you are telling me that the reason the thing came to grief was because scientists didn't analyse the results of the experiments that they themselves carried out to try and replicate what you had done. Now, the question has to be asked again, why not? We are talking about something that is unimaginably important here.

MF: The resources required for analysing data are much larger than the resources required for gathering the data.

JH: But here we are talking about work that....

MF: Well absolutely, it is one of the diseases of present-day science.

JH: Billions of pounds is spent on research in science and if these experiments had delivered the goods, in layman's terms, would be worth unimaginable sums of money, billions, trillions of pounds. So for the sake of a few million...?

MF: Yes, that's the way it is.

JH: That is stunningly stupid, if that's the case.

MF: I'm afraid that is so but that is the way it is. The number of people who analyse their results in great detail and with sufficient and adequate care is really quite small.

JH: Well then, why isn't there somebody out there now, saying "Fleischmann was onto something, we believe in what he did."

MF: Well, there are people who say that.

JH: And why aren't they putting hundreds of millions of pounds into it?

New Energy Times Archive

MF: Well, you see then you have the question of the sociology of the subject. How can you put a lot of money into a field of research which has been discredited?

JH: But it was discredited, you say, because the analysis of the results was not carried out.

MF: Correct. I think people should nominate the pieces of research which they believe are critically important and those investigations have to be re-investigated maybe ten times.

JH: Why are you not continuing to work on it yourself now?

MF: Well I am.

JH: Where?

MF: I would prefer not to discuss that at the present time. At the present time, I am re-analysing—actually, this is very interesting—I am re-analysing old research data obtained by ourselves and other research groups, and I am starting work with another research group.

JH: There are those who - the conspiracy theorists in this world, and there are plenty of them—who believe that the reason some of the great discoveries never get made is because there are vested interests and if we did have limitless energy, not necessarily free, as you say, but compared with today's prices, very very cheap indeed and non-polluting, it would destroy whole industries. The oil industry clearly, the people who make the internal combustion engine and so on and so on, the implications of it would be profound beyond belief. Anything in that theory?

MF: It is always tempting to resort to conspiracy theories. But you should only do it as a last resort. However, one extremely intelligent person I know, a scientist I know, says, "When you have assembled all your facts, there has to usually be a single explanation of all the facts and, if the explanation of all these facts is that there is a conspiracy, then you'd better take that seriously." Am I answering your question?

JH: Well, so far, but then, as you would say "and then...and then"?

MF: I'm afraid that if you assemble the facts, if you assemble all the information about the development of the subject you would have to come to the conclusion there is a conspiracy.

JH: And who is...?

MF: That you don't know. But it looks strongly like a conspiracy. Several conspiracies, well, conspiracies within conspiracies.

JH: You could understand why an oil-producing company would be concerned about cold fusion. It's difficult to understand why a government, which also spends a great deal of money on research, would not seize it with both hands and say "This we must, for the good of mankind, develop." So doesn't a conspiracy theory come unstuck at that point?

MF: It depends on what the conspiracy deals with, doesn't it?

JH: How do you mean?

MF: What is the motivation of the conspiracy? If there is a conspiracy.

JH: In the case of the oil company, for instance it's obvious....

MF: That not be the motivation of the conspiracy, may it?

JH: What other motivation could there be?

MF: Well, I think that is one which people have to work out for themselves.

JH: Well, you tell us, you know.

MF: I'm not going to tell it on BBC, on Radio 4, no, I am not going to say that on Radio 4, I'm sorry I'm not.

JH: But can there be any reason why a government should be less than enthusiastic...

MF: Of course, of course. Right at the beginning, in that article which perhaps you have read, I said at that time the Head of the US Department of Energy was Admiral Watkins and I said, "Would Admiral Watkins welcome the notion of nuclear research being carried out in Chemistry Departments?" It is ludicrous, of course he would not. The motivation would have to be this must stop, if this work is going to be done at all it's going to be done in national laboratories. Something which I agreed with at the time.

JH: But this is a matter of individual pride getting in the way.

MF: No, it's not a question of individual pride, it's a question of sensible security. Supposing you have this type of research carried out in university departments, goodness knows what will be discovered. Should it be done in university departments?

JH: Well then fine, why aren't governments, why is not the US Government taking your work and saying this will now be done in a government laboratory?

MF: Well, perhaps they are. Well, you don't know, do you?

JH: Do you know?

MF: No, I don't know.

JH: Is it conceivable?

MF: It's certainly conceivable. But I don't know.

JH: So how far are we away from another news conference such as you held back in 1989 with somebody saying: "Well, we have cracked it."

MF: It could happen at any time.

JH: Really?

MF: Yes. The production of a demonstrable, useful device could happen at any time now. It doesn't mean to say it will happen but it could happen at any time. The creation of a useful, commercially useful, device of course, will take a considerable time.

JH: By which you mean years?

MF: Yes, years.

JH: But you, now in your 70's, are still working and you believe that in your lifetime you will see this work?

MF: Well, you know, I am not a spring chicken and I'm not very fit so I don't know whether it will be in my lifetime, but I think it is around the corner.

JH: Professor Fleischmann, thank you very much indeed.

MF: It has been a pleasure to talk to you.

[end]

"Free Energy" Excerpts —Continued from page 43

and I became a Ph.D. in Electrical Engineering and Systems Engineering, and not one professor ever heard of it. And, yet, there it was in the library. So, part of it is, most scientists are specialists in their own area, and science today is very fragmented. Now, for those that know that the zero-point energy exists, they may argue, "Well, it's random in its nature and, therefore, it can't be tapped as an energy source." But very recent work in thermodynamics by Ilya Prigogine, who won the Nobel Prize in 1978, shows how this energy could become self-organized if the proper systems conditions could be fulfilled. And that's what happening in some of the experiments and some of the inventions that are tapping this energy and producing anomalous energy. Another resistance is the physics community, especially, that really know about this energy realize if you could tap it, everything would change. The nature of physics would change, the most important foundation of all physics would then be the quantum, the quantum energy that's imbedded in space. And, really, we don't understand it. And it's extremely mathematically difficult to do computations in it. And it turns out, it's probably going to be the basis of String theory in the future.

New Energy Times Archive

Hot Fusion Man vs. Cold Fusion Man.... Dr. T. Kenneth Fowler and Dr. Eugene F. Mallove

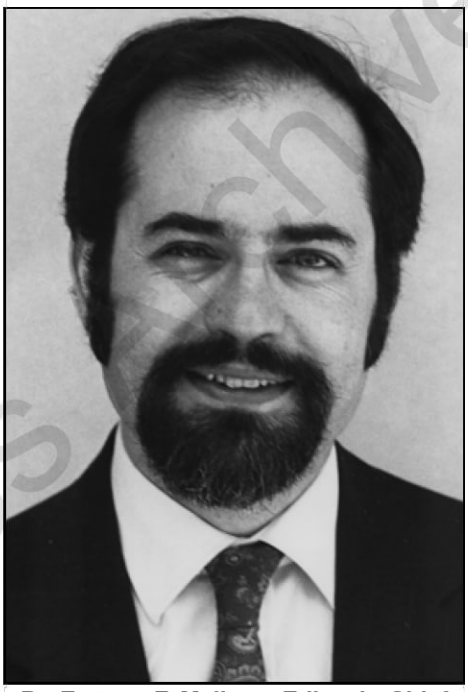
Transcript of National Public Radio Program, "Talk of the Nation" - Science Friday
April 11, 1997
Prepared by *Infinite Energy* Magazine

Tape Ordering Source:

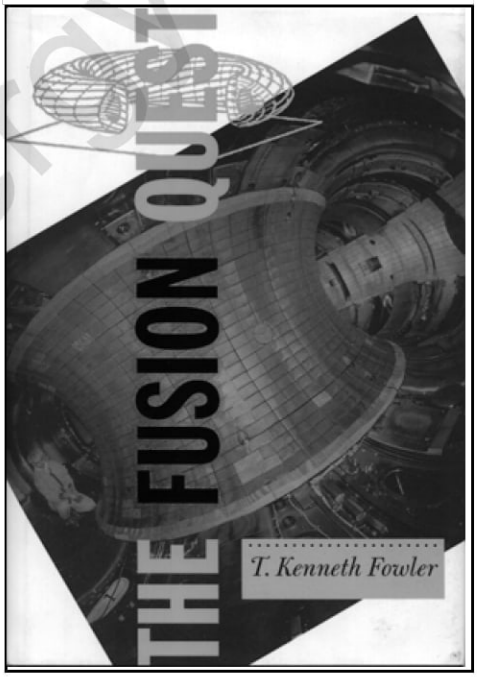
National Public Radio
635 Massachusetts avenue
Transcripts and Tapes
Washington, DC 20001-3753

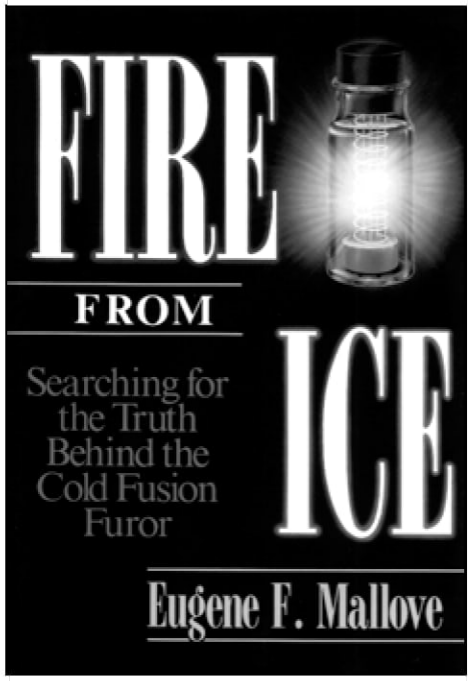
Audience services, Tel. 202-414-3232
Tapes and transcripts, including
"Science Friday" —Tel. 888-677-6397

Prof. T. Kenneth Fowler of the University of California at Berkeley, Author of *The Fusion Quest* (Johns Hopkins University Press, 1997)



Dr. Eugene F. Mallove, Editor-in-Chief of *Infinite Energy* Magazine and author of *Fire from Ice* (John Wiley & Sons, 1991)





Host of *Science Friday*, Ira Flatow (**IF**):

A headline in small type briefly flashed through newsrooms last week, maybe you missed it. It announced the end of the life of the country's most prominent fusion experimental reactor, which held the record, the world record, for controlled nuclear fusion. Of course, I'm talking about the Tokamak, the Tokamak reactor at Princeton University, a victim of congressional budget cuts.

Step by step over the past few years, this machine has approached the practical break-even condition in which fusion energy output equals the energy needed to drive it, but the costs of fusion research are large, the goals remain rather distant and the next stage of development already requires international collaboration. Scientists around the world are already working on plans for an enormous reactor called the International Thermonuclear Experimental Reactor, the ITER, whose price tag is already more than $10 billion.

This hour we will talk about where we stand in our effort to harness the power that lights up the Sun, and where do we go from here in our attempt to create an energy source that many people believe could be as clean and plentiful as any energy source we can find.

1-800-989-8255 is our number, 1-800-989-TALK, if you'd like to get in on the discussion, you are welcome and you can also join in on-line chat at our website at www.npr.org and just click on the "your turn" area and look for *Talk of the Nation*.

Let me introduce my first guest. Dr. T Kenneth Fowler is the author of *The Fusion Quest* published by the John Hopkins University Press. He is also Professor of the Graduate School at the University of California at Berkeley and he has spent 30 years in fusion energy research and he joins us now from member station WUMM in Milwaukee.

IF: Welcome to the program, Dr Fowler.

TKF: Good afternoon.

IF: Let's talk about fusion. I think people

New Energy Times Archive

are not quite sure what's the difference between fusion and fission. What happens in fusion?

TKF: Fusion is a form of nuclear energy, fission is a form of nuclear energy. In both cases, this goes back, of course, to Einstein's brilliant discovery in the early 1900's that mass, weighty things, can become energy, and in the case of fusion it's the light elements, hydrogen, for example, is the fuel of the stars. In the case of fission, it's very heavy elements, uranium, that split in half and produce energy. Actually fusion was discovered first.

IF: So in fusion you are putting elements, small elements, together to make big elements, fusing them?

TKF: Yes. For example, hydrogen becomes helium, the same gas that fills toy balloons.

IF: And so this is what the H bomb is built from?

TKF: Yes, as opposed to the first atomic bomb which was uranium.

IF: Now why is the H bomb, which is so much powerful than the A bomb, why is it so much more powerful if you are just putting these atoms together?

TKF: It's really the quantity, the amount that you are able to release energy from and tritium and deuterium, forms of hydrogen, are all much cheaper, easier, more available, but it was difficult to create that reaction. The hydrogen bomb was actually set off by an atomic bomb.

IF: So you need a tremendous amount of heat, from an atom bomb, to ignite the hydrogen bomb?

TKF: Yes.

IF: No where does the energy come from that is released when you fuse together these atoms?

TKF: Well, the source of energy is the fact that when the atoms join afterwards the result weighs less than the pieces weighed and that difference in mass is what Einstein had discovered would create energy. It's also the energy of the stars, of course.

IF: So that's the famous phrase $E=mc^2$.

TKF: That's right.

IF: That shows the tremendous amount of energy that can be....the equivalent energy and mass.

TKF: "m" stands for mass.

IF: We mentioned the death of the Tokamak, although it may be premature to call it the death of the Tokamak, it's being mothballed. Does this signal the end then?

TKF: Are you speaking specifically?

IF: In Princeton

TKF: The big Tokamak at Princeton?

IF: Right. Is this a very sad time for fusion?

TKF: Well, I regard it as sad. The TFTR is the cover of my book that you referred to earlier which has just come out this month. It's already accomplished enormous things. The sad part is, of course, that it could accomplish more things if it were allowed to continue to run. There does continue to be, in this country, the very large facility at General Atomics, I believe that's the largest industrial activity in fusion in the world, in San Diego.

IF: Now a very famous and noteworthy event occurred after that Tokamak in 1983, you achieved break-even point. Did you actually get to the break-even point?

TKF: It was quite, but it was very close.

IF: What does that mean?

TKF: Well, what that meant was, fusion is like a fire, you have to light the fire, it takes energy input to get it going and you would desire that the fire keep itself going, that's to say that the fusion process keeps itself going, we call that ignition. Break-even was just a signal that we had gone from early beginnings in which we knew very little and could not create fusion, to the point that we were finally getting back about as much energy from the process as was being put in to make the process happen. But it's not going all the way, that machine which you referred to, the international machine called ITER is the one that would be fully ignited and burn by itself.

IF: And what is the schedule at ITER? And I'm reminded when I ask that schedule there's a very nice quote in your book ... "We'll know we're getting somewhere when they stop asking whether fusion power will work, and start asking what will it cost."

TKF: Yes.

IF: Are we at that point where we are asking now?

TKF: Most definitely and, of course, the first question is what is the cost of the research? And that motivated going international with magnetic fusion in a big way in the early 80's which became this ITER project.

IF: And ITER is going to be a $10 billion project?

TKF: It's about 10, actually the cost of the facility is not nearly that but if you costed it the way we would in the US, which is — and what is it going to take to run it for a period of time—what does it take to develop the equipment to build it from and so on, it would be about $10 billion.

IF: And where is it going to be located?

TKF: Well, there's been no set site, the most likely place would be either Japan or somewhere in Europe; Italy has been speaking about it. You asked when, I'm sorry I didn't answer that. The machine is now in what's called the engineering design phase, which means the step at which you are drawing things you could rebuild from, or at least do the cost estimates accurately from; and that will be completed next year when construction could start as soon as people made up their minds to do it, in which case it would be in operation, I believe it's in the order of 2005, would probably be the earliest date, I don't recall exactly the date.

IF: Now the US and Russia were the two driving forces behind this machine?

TKF: Yes.

IF: And both now have, sort of, pulled back from the idea. Yes. Well Russia is broke so we can understand that.

TKF: Yes, well I hope the US isn't broke but there's definitely been a pull back on research on energy in particular. By the way, there is a big study going on just now that might turn the tide on that issue, sponsored through the President's Office of Science and Technology and maybe that will change things.

IF: So with Russia out, have we sort of coerced the big industrial powers like Japan and Europe into taking the slack up?

TKF: What happened was that the project that was going in the mid-1980's, that was a time of rapprochement between the US and the Soviet Union and so at the first summit between President Reagan and Secretary Gorbachev, the ITER was created as a joint project and, at that time, the US insisted that Japan and Europe, with whom we were already looking at such a project, become partners and now, all of a sudden, they are the major partners.

IF: We've been working on fusion for 50 years now, at least, I would think we've

New Energy Times Archive

thought about it a lot ...

TKF: The 50's was when it really got going.

IF: Why don't we have it working yet?

TKF: If you look in terms of progress there's been enormous progress, we have a major progress, it's a number that you can go and measure what's going on in the experiment and that's doubled every year over 40, 50 years but on the other hand, we had a long way to go. So the main reason is the critical size at which fusion becomes big enough that it can burn by itself and ignite and, as far as we know, there is no way to do that short of making a lot of power and that's what this ITER is about.

IF: So, it's physically the size of the plant that has to be big enough.

TKF: That's correct.

IF: And we haven't built it up that far yet?

TKF: That's right - step by step - and this TFTR at Princeton is a major milestone.

IF: I remember a few years ago, it was more than a few years ago, going up to California and looking at a giant laser powered fusion device called Shiva, I think it was called. And you talk about that in your book and its next generation which is Nova. So that takes a totally different approach. The Tokamak uses magnetism to confine the plasma to create the fusion and this laser basically, you zap it with over a hundred laser beams on all different sides to compress it and make it fuse? How far is that coming?

TKF: The largest facility in the world is at Livermore, Calif., the Lawrence Livermore National Laboratory and it's called Nova and now has been approved to go forward with the next step called the National Ignition Facility. These facilities are funded by the Defense Program's portion of the Department of Energy because it also, in fact, mainly for now, has uses for the military program.

IF: Let's go to the phones, to Lewis in Tulsa....

L: My question is, I read an article that said even if you could never produce power from fusion, if you could just break even that there were some possible commercial applications on it. Is that true?

TKF: Well, there are, interestingly enough, there are already applications from the technology that creates fusion. A lot of the companies involved with making computer chips are already using the technology that was developed in fusion. Fusion also can make neutrons, and neutrons can change materials from one thing into another, I think it's been discussed, that it can actually produce fuel for fission reactors from the neutrons from fusion and it can do all that short of really igniting.

IF: Any health benefits, you know for zapping tumors or anything like that, will it come out of atom smashers here? Shooting in the wind here - thinking that there might be something?

TKF: Well, perhaps in an indirect way, of course, and also equipment already having been made that produces isotopes, and I think that's part of a major kind of health benefit.

IF: Let's go to Ed in Berkeley...

E: Well, I'm very happy and surprised, I had no idea that fusion was so close and I try to keep up as much as I can.

IF: Well, how close do you think we are?

E: Well, he keeps talking about a feasible project in—what does he say, 2005 — in a country. There's a short-list of countries? That sounds a little close. You know, if it's to the point of going out of R&D into the engineering that's a lot closer than I thought. I've got a question. I'm wondering, I understand that it's fairly clean and I'm wondering if there are any isotopes that are produced that are radioactive after you are done. I'm sure you don't have the messy problem of the fuel rods as you do in fission but, what's the down side? Let's face it what are the negative by-products?

TKF: I'm glad you asked that question. It's chapter 15 of the book. I will answer that, before I answer it, let me just comment that with regard to the ITER, the international machine that could be operating soon after the turn of the century if people decide to build it, that would actually produce 1500 megawatts of power and it would do it for minutes and then repeatedly and then it could do it steadily just like a power plant. It wouldn't be a power plant, it wasn't intended to be a power plant, it would be burning by itself and producing the heat a power plant would make and would become the test facility for doing the nuclear engineering of actually dealing with this question which you now raise, and if you had this, is it a good product or will it hurt us?

Everything nuclear always has some radioactivity associated with it. So do you and I, so does a banana, the question is always how much and of what character? In the case of fusion, if you burn the fuel that we would expect to go first which is deuterium and tritium, tritium itself is radioactive, but it decays in 12 years, we actually have to create it inside the machine in order to have the fuel, you make it from lithium which is not radioactive, so the real issue is the damaging of the machine itself by any neutrons for example that are made, but it's not only neutrons, the neutrons are a focus of attention. Yes, neutrons would turn the machine into something radioactive and the point is to build it out of something that doesn't remain radioactive very long.

IF: Do you replace the parts that become radioactive?

TKF: Actually it would be more like the de-commissioning of a reactor which is mostly something that you do at the end of life. There would be a certain small quantity of parts that would probably be changed out.

IF: So what would be the lifetime of a fusion reactor?

TKF: Well, we wouldn't say we'd gotten there if it didn't meet the normal standard of 30 to 50 year life for a plant.

IF: In the next step of building the ITER giant fusion reactor, are we so close that you can just build it and know it's going to work? Have we tested out the concept enough?

TKF: Well, there's always going to be issues, my own opinion is that we are close enough. One thing you have to remember is when we create these devices, it's a little like aiming with a slightly wobbly gun but if you are close and you build something with sufficient flexibility you can tune it up and so often there's a year or two when we build a new machine that we get it to perform at it's peak performance but, given that, I would say that we are close enough to embark on this. There are issues we could go into if you want to.

IF: I want to get into one of those issues, I think something that's very confusing to people is they hear that the fusion on the Sun happens when things get almost 100 million degrees. Is that the temperature you are going to have to bring up the fuel inside the fusion reactor to? And if we do and people have a tough time seeing this in their mind, will it keep the walls from melting at 100 million degrees?

TKF: I'm sitting here looking at the cover of my book which has a picture that is prominent from the device in Princeton. There's a man in the picture and where the man was standing the temperature was

New Energy Times Archive

300 million degrees, I don't know if that was true last Thursday or Friday when they shut the machine down. But they've been through, off and on throughout the operation they would run temperatures like that, so temperature is kind of a funny thing, you have to ask how much quantity is there? That gets at your question. There's very little material inside a fusion reactor, I used to say there's not enough to fill a thimble, it's actually grams and so there's no heat contact, it's very very hot in terms of temperature which means it would cool off like crazy if anything touched it, but it wouldn't heat up that which touched it very much. In the case of a huge operating reactor that's not so true that you'd want to put your own finger in there but the point is that the heat capacity is very low, there's almost no fuel in there, it's evacuated, just a little bit of gas inside.

IF: My guest is Kenneth Fowler who has spent most of his life in nuclear physics, a fusion expert, author of the book *The Fusion Quest* which is published by Johns Hopkins University Press. This is Talk of the Nation, Science Friday.

When people find out that you work in fusion, do they back away from you a little, as if you are radioactive yourself?

TKF: No, but I was Chairman of a nuclear engineering firm until a couple of years ago. I found the interesting thing over the years that I have been involved was that first, of course, nobody was. I would sit down on the airplane and they would say, "What do you do?" and I would tell them and they'd look blank. I do find many more people know about the effort to create fusion. By now I find that the prominent question is "Well, are we ever going to have it? When will we ever get there?"

IF: Let's go to Steve in Philadelphia.

S: I've a couple of concerns, and the first one is that fusion is generally not renewable. We are consuming hydrogen. The next one is when you take into consideration all the overhead involved in first getting the atomic hydrogen and deuterium or tritium that you need by containing the reaction and so forth, is fusion really more efficient than, let's say, capturing solar energy in either chemical form or directly using photovoltaic cells?

TKF: Concerning renewable, the idea of renewable is mostly associated with things that grow or were created in one way or another by sunlight and, of course, that goes away in the life of the universe, the amount of fuel to provide fusion on Earth is comparable to that, so it's really not an issue of resource. A little girl once sent me a letter when I was head of a fusion program in California asking "Well if this comes from water, will you destroy the water?" The fusion fuel content of water is one part in five thousand so we really leave the water, we take an ever so slightly small amount of hydrogen out.

On the question of "Is it efficient?" The real issue I think you're getting at there is that, first of all, solar energy of course, is coming to us every day. That is, a fusion plant created in the universe and we benefit from it, we wouldn't exist without it. The solar energy arrives on the Earth, of course, in a diffused form, if it weren't so we'd melt. And so the big issues here are economic and the most important issue is: when we talk about energy we are talking about the life blood of the nation and we shouldn't be talking about only one thing. I would not say that we should only do fusion, I would not say we should attempt to do everything only with solar power and we're nowadays doing things with actually coal more than people appreciate, as our way of making electricity, we'll run out of that, we shouldn't depend only on that. We have the kind of broad-based energy development program for this nation that was envisioned back in the 70's after the oil crisis.

IF: OK, Steve?

S: Well, I still didn't get an answer as to how the efficiency, when you take into consideration all the overhead does compare to something like....because I know photovoltaic cells are not terribly efficient so I used that as an example.

TKF: OK, I misunderstood that part of your question, let me address that specifically. Fusion is a heat source to make electricity as efficient as coal and solar is not.

IF: You briefly touch on, in your book, the whole flap over cold fusion and you say without some convincing evidence of a nuclear process that could produce vast amounts of energy, the other claims of intense heat produced by the reaction aren't likely to be of much interest. What would it take to get physicists to believe that cold fusion would work?

TKF: They would have to see the fusion happen.

IF: There would be products left over from a radioactive reaction?

TKF: Well, that's an example. I once served on a committee as I mention in the book. I have not really dealt with cold fusion since then. That was in '89 and '90. I follow it a little bit, but the main thing that was true then and, so far as I am aware, is still really true is there's not very clear evidence that whatever was happening was fusion at all and the daughter products are one of the symptoms.

IF: Let's quickly go to Fred in Seattle.

F: A couple of points, the first is you said that fusion research has been doubling its results every one or two years for fifty years, even at the conservative end of that, at every two years, that would be something like 64 million times the result that you started out with, I don't think that anybody would hire a ditch digger who said that he'd gotten 64 million times as much done as when he started out but he still doesn't know when he's going to have your ditch dug. There's just no end in sight. I think ITER is a wonderful name for a new fusion program— it's been eating up tax dollars for decades. The other thing I wanted to bring up is a facility you mentioned, the National Ignition Facility down in California's Livermore Labs. You said that as part of the fusion energy research program the Department of Energy has put up energy as a billboard in front of this facility but, in fact and under pressure, the Department of Energy has admitted that it is entirely a nuclear weapons laboratory.

IF: Where did they admit this?

F: They have admitted that in congressional testimony, it's budget is coming entirely from nuclear weapons budgeting money which by law has to go entirely for nuclear weapons design.

IF: Let me get a quick reaction, Dr. Fowler?

TKF: OK, first of all, ITER fortunately was from the Latin which means "throwing away" not eating up. But the serious point here, I said at the outset that that program was funded by the Department of Energy's defense program which indeed is military. It's not a military program under the Department of Defense. It's illegal in this country to develop nuclear weapons except under civilian control, but it is for the purposes to which the gentleman alludes. What I'm referring to is the spin-off potential of the NIF as an energy source. All the network of computer interchange today, the Net, was in fact developed by the military.

IF: This military project will also have a spin off?

TKF: Absolutely.

•••• Station Break Interval ••••

New Energy Times Archive

IF: Welcome back to Talk of the Nation, Science Friday. I'm Ira Flatow. We're talking this hour about fusion with my guest Dr. T. Kenneth Fowler, author of *The Fusion Quest* which is out now, his brand new book it's in Johns Hopkins University Press. Dr. Fowler is also Professor of the Graduate School at University of California at Berkeley.

Now we already mentioned that the cold fusion beginnings that began back in 1989 when two scientists announced that they had actually created cold fusion, in other words fusion in a bottle without the high temperature we are talking about the hundreds of millions of degrees and it caused quite an uproar, we're all familiar with that and then it was sort of dismissed as unworkable and that was the end of it. Well, apparently not according to everybody. Eugene Mallove is the Editor in Chief of *Infinite Energy* Magazine which is devoted to talking about and exploring cold fusion research and other kinds of energy, he joins me now from member station WEVO in Concord, New Hampshire. Welcome to the program.

EM: Pleased to be on, Ira.

IF: Most people thought, and think, that cold fusion is dead, isn't it?

EM: It got very very active in the very beginning and it spread to many countries and now it is in fact in a commercial development phase. There are now reactors working as we are speaking on the radio today that are producing of the order of several thousand watts of extra power , which I would just like to point out is far far beyond what, of course, the hot fusion program has produced —which is, of course, no excess. The hot fusion program, by the way, is a very noble quest and I myself— all my life since I began being interested in that science and being an engineer— was always in favor of. But now we have a system which produces no radiation and is, in fact, being commercialized. It's not supported by the Government.

IF: If it's commercialized, shouldn't we be seeing cold fusion products, you know the phrase these days is, "Show me the money." Everyone would always say, if you are talking about the supernatural: "If it really works, someone's going to make a lot of money out of it."

EM: Yes. Well hot fusion, for example, has been going on for 40 years now.

IF: I'm talking about cold fusion.

EM: There is a product on the market already which is the nuclear reaction product demonstration kit of Clean Energy Technologies in Florida, and they will soon be showing at the American Nuclear Society Meeting in Orlando this June. They will be showing some more advanced technology. They have already demonstrated to our satisfaction they have a reactor that you put in a watt, let's say, and you get out 1,000 watts and that was a very brief test. A recent patent was just approved, Patent No. 5,607,563—anyone can look it up—it shows in the data putting 2.4 watts in of electrical power and getting 240 watts of thermal power, and that's typical actually of some of the reactors from a variety of companies that are now commercializing this source.

Now this source of energy, unlike hot fusion, still remains contentious. Dr. Fowler correctly pointed out that one of the controversial aspect of cold fusion was where are the nuclear products, or any products, or how can we explain this? Well, products have been found in cold fusion, even from the earliest days, now they are getting clearer. For example, just now in Japan the Proceedings of the Japan Academy of Science and a whole special issue of the High Temperature Society of Japan has Dr. Yoshiaki Arata's and Zhang's paper which show in cold fusion experiments that they have run for as long as 5,000 hours. It shows helium-4 and helium -3 production.

IF: In the old days they used to say that these were all contaminants, that the research wasn't good enough and care wasn't taken.

EM: Well, Dr. Arata is with the hot fusion researchers in Japan and he's done meticulous work. Work in this instance takes small particles of palladium, which is what Pons and Fleischmann used originally, and after the reaction takes place in a special cold fusion cell that he has developed, he puts it in a chamber and they heat it to a thousand degrees centigrade and only then are the helium-4 and helium-3 reaction products seen. So it's essentially irrefutable, the helium is clearly being locked in when it's produced in the palladium. By the way, helium-3, as we all know, is very rare on Earth. The fact that it occurs in an isotopically anomalous ratio, that is, it appears in a ratio that has nothing to do with its natural abundance, makes this astonishing and, further, the other cold fusion miracle is clearly evident, that is, with hundreds and hundreds of millions of joules of energy per cubic centimeter released, as Dr. Arata points out here in these technical papers. there should be, by hot fusion mechanisms— if it were *hot* fusion which, of course, it isn't— there should be deaths in the laboratory. Of course, there are no deaths, so what we're seeing is what we have seen from the beginning in cold fusion. We are seeing the primary signature that was easiest to see in the beginning, which is the excess heat, and now we are seeing, increasingly, explanations of the products and there are about half a dozen companies working on products.

IF: Half a dozen companies working on the products? One of the big problems with cold fusion in the early days was that Pons and Fleischmann could do it but nobody else could and all these scientists had tried. Are you saying now that anybody can reproduce cold fusion if they want to under the right conditions. Why was it so difficult in the beginning and now it isn't so difficult?

EM: In the beginning we were in a learning curve, there is no question about it, but it's not really true to say— let me correct the record— that almost no one could do it in the beginning. There were numerous replications and, in fact, in 1994 the Electric Power Research Institute, they reported this in the latest issue of *Infinite Energy* magazine, its report said, "We confirm all the results of Pons and Fleischmann." That's it. Our own national laboratory, Los Alamos National Laboratory, has data in our magazine and on the World Wide Web which shows the production in some kinds of cold fusion experiments, the ones that would be commercial, the production of tritium. Tritium is radioactive. We would not presume that that product would be used in our commercial cold fusion systems, but it is possible to do it in a way that does not fit into the normal understanding of physics.

IF: Well, what kinds of product do you think will be coming out and what kinds of things we should be looking for? And who will make them?

EM: OK, let me just run down, Clean Energy Technologies, it seems to me is one of the foremost companies here, but it's not the only one by any means. It's actually a race now, in my opinion, to come out with the first commercial products. They are going to be demonstrating their technology in Orlando at the International American Nuclear Society on June 1st and June 5th and they will be discussing some of the other manifestations of their processes. They were just awarded a patent on the ability to remediate some of the nuclear waste which is thorium and uranium. They have already demonstrated this in the laboratory.

New Energy Times Archive

IF: We've come this far in cold fusion that there are patents that have been granted for it and they have been asked to display their wares at internationally accepted Nuclear Society meetings?

EM: Yes, and Dr. George Miley who is one of the major nuclear engineers engaged in this research, is also the Editor of *Fusion Technology* magazine, a good friend of mine and a friend of our magazine *Infinite Energy*—he will be discussing at that meeting some of the isotopic and element changes, transmutations, that have been seen in the Clean Energy cell. I have to point out that there are other companies, there is Eneco in Salt Lake City, which I just learned not only have an interesting patent position, but they are aiming to build a 2kW heater within a year based on a gas-kind of process in cold fusion, a high temperature gas process. Likewise in Pennsylvania a company that doesn't even call itself a cold fusion company but is nonetheless putting out things on the World Wide Web—called Blacklight Power, Inc.— they have also a very high temperature process that we now see former members of the Reagan administration and the Department of Energy in their news announcements have supported, and there are certain power companies.

IF: Such as whom?

EM: Let's see, I have it here. Shelby Brewer, it is a direct quote from the Reuters release: "I am convinced that there is something of enormous impact here and it's only a question of time until we can garner the capital and infrastructure to take it into commercialization." He was the Assistant Energy Secretary under Reagan and former Head of ABB Combustion Engineering.

IF: You told me in a past conversation we had that Motorola had also experimented with cold fusion?

EM: Yes, Motorola, the radio company and the electronics company, I have one of their very fine computers on my desk, they tested one of the Clean Energy Technology cells. They turned it on and they were getting about 20 watts of power out with a very small input power. What they then did, and I've seen the data on this—I would like to see it up front myself— but in any event they did turn the input power off and for 11 hours at least, and possibly much longer, I saw 11 hours of data, they sustained 20 watts of output with no input power.

Now, the basic problem here is this; it looks like a miracle and it is one, in the sense that it's a very simple measurement to make, the temperature of the water going in, the temperature of the water going out and you have a certain flow rate, there is no input power and if it goes for 11 hours and you have 20 watts persisting in this very simple calorimetry system, it's case-closed. Many other companies are doing this. Now there's a company in Massachusetts called Jet Energy Technologies and they are at the moment qualifying beta site testing facilities around the country to demonstrate their cells. In California, there's a company called E-Quest, and it's just on and on and on. We are principally in a commercial era. If you asked me "Are the hot fusion people, or let's say, the high energy physics people, are they going to agree that this is correct?" I would like to think that they would look at experimental data and come to a positive conclusion. Unfortunately, my conclusion is this: no experiment, even if produced by Professor Arata, who is a hot fusion man himself, or George Miley, who's a hot fusion man and the Editor of *Fusion Technology*, it's not going to impress them. There's too much vested interest here basically, that's what's going on. A classic paradigm shift in science.

IF: Dr Fowler, I know you don't want to get into a debate here but do you have any reaction to this. What would it take if any of this is true to convince you?

TKF: Well, actually I think I'd rather just stay out of that. One has to invest his time...

IF: But what Eugene Mallove is saying is that mainstream scientists would just stay away from it, like you. You wouldn't even touch it with a 20 foot pole. How is anyone going to invest their time in it? How is one to get an independent person like yourself to look at it and say, "It's a bunch of bull," or something?

TKF: Well I think that, taking this work to meetings, such as was mentioned to the American Nuclear Society is the way that things like this get sorted out. There are forums which people can go to and people do listen. I've been to many meetings in which one person showed up for the paper and it was the one person who made all the difference.

IF: Let's go to Martin in Los Angeles...

M: On the subject of cold fusion I wanted to say a couple of things. First of all, I read in the newspaper that the founder of the Princeton Fusion program, the Sherwood program, I think it was called, passed away within days of the Tokamak being closed.

TKF: Yes, that's true Lyman Spitzer founded the lab and died the Monday before the machine shut down.

M: What's interesting though is talking about perhaps erroneous results beginning a program in cold fusion, if you read the early history of the hot fusion program, Dr. Spitzer was spurred into the original proposals because of an announcement from Argentina, Juan Peron in 1950 or '51 had hired an ex-Austrian/German Nazi scientist who announced the control of hot fusion. It was generally pooh-poohed in the press and, indeed, did not come to anything. Some people think it was a simple error, some people think it was a hoax, but it spurred the whole hot fusion program, certainly in the United States and the Soviet Union and that program lasted for 45 years and is still ongoing. So it's interesting to see how erroneous results may or may not start a major area of research. Particularly as hot fusion hasn't been that successful, it's come across some very fundamental problems in getting it done.

IF: Well, you know, it took 40 years to perfect the light bulb. So it could take a long time in any of these technologies.

TKF: Of course, every hot fusion and every other kind of laboratory you can think of around the world once the Pons-Fleischmann announcement came out, made some effort at trying to replicate what was going on. So they do pay attention and some persist in it and some do not.

EM: And some do persist because they've seen the positive results. In the case of one hot fusion laboratory, namely MIT, they did get positive results but chose not to present them fairly. Several engineers, by the way, myself and a Jet Technology engineer, Dr. Mitchell Swartz, have found that the MIT results were indeed positive— but let's not go over that. Let's just talk about the fact that what Freeman Dyson said before cold fusion even began, he was not a cold fusion supporter, he said this: "There is no reason why a new technology has to develop like fission and hot fusion on a 35 year time scale. All it needs in order to go fast is small sized units, simple design, mass production and a big market." He said that in 1988, he was absolutely correct, that is exactly what cold fusion is all about. It is going to end the fossil fuel age and the commercial products which will be seen in the next few years will lead to, in my opinion, the rightful demise of, not plasma physics

New Energy Times Archive

which is a great science to study and I appreciate Dr, Fowler's work in that, but it will lead to the demise, I'm happy to say, of the ITER reactor and many of these other large central-station unit proposals which really are, in my opinion, white elephants.

IF: Let's go to Mel in Plantation, Florida..

M: I have become interested lately in fusion and ionization. My question is, is hydrogen and it's isotopes the only fuels being considered for fusion? I don't know much about cold fusion but I'm wondering what about compounds containing hydrogen?

TKF: In the hot context, of course, a compound would dissociate. So it would go to its elements but, in fact, people have looked at things, for example, hydrogen and boron in combination.

IF: Do you use hydrogen because it is so lightweight, because it's easy to get the atoms to fuse together?

TKF: The main reason that fusion research dealt with hydrogen from the beginning was the deuterium-tritium reaction has the lowest ..... point as far as we understand it, at about 50-100 million degrees depending on details.

IF: Let's go to Ed in Newton, Mass....

E: I have some comments about hot fusion and cold fusion. I'm concerned about the radioactivity, I don't think it's been emphasized how much danger there is from a hot fusion reaction, I'm very concerned about that. I think it would be much more promising to put the ten billion dollars into geothermal research to develop practical geothermal power. They say that anywhere on the Earth practically you only need go down about 25 miles and you'll find plenty of high temperature...

EM: I'd like to comment about that.

IF: Let me ask Dr. Fowler first because he asked about hot fusion radioactive products.

TKF: As I commented earlier, I think the main thing that we should understand is that either energy is not a problem, but it is, or that we need to deal with this on a broader scope than just having one's favorite idea. I don't promote only fusion, I would like to see a broad-based energy research program, geothermal included.

IF: Have we lost all that after the Carter administration? Energy tax credits and all the alternative energy?

TKF: Yes.

EM: The hot fusion program has, for years, made it seem as though this was perfectly clean, Mr. Clean kind of energy, it is not. The way that hot fusion gets its energy is by high energy. 14 million electron volt neutrons bombard the casing of the Tokamak and go through and heat up some molten lithium and this gives much radioactivity which will have to be dealt with. Now in the case of cold fusion, we see no damaging radioactive materials, in fact, in some instances in cells, we have now completely serendipitously in cold fusion found ways to take thorium and uranium and, perhaps, before much longer, other radio nuclides and deactivate them at low energy. It does seem shocking and I know....

IF: You mean take the radioactivity away from them?

EM: That is correct, they have been put in cells. Clean Energy Technologies has a US patent just granted and you put the radioactive materials in a cell thorium and uranium, in this instance, and then within hours or a large fraction of a day at almost no energy cost, it is possible to make the radioactivity disappear.

IF: Dr Fowler, any answer about the radioactivity?

TKF: Well, I did deal with that earlier, I don't know if the listener heard it, it's Chapter 15 in my book and I show that its quite profoundly different for fusion but absolutely there's radioactivity associated with the process.

IF: I'd like to thank both my guests, Dr Kenneth Fowler, author of *The Fusion Quest* and Professor of the Graduate School at University of California, Berkeley and Dr. Eugene Mallove, Editor in Chief of *Infinite Energy* Magazine in Concord, New Hampshire.

If you are a science journalist, *before* you write about cold fusion—*do your homework and GET THE FACTS!* Subscribe to *Infinite Energy* Magazine P.O. Box 2816 Concord, NH 03302-2816

Paradigm Paralysis

Fowler Book Quotes Compiled by *Infinite Energy*:

Dr. T. Kenneth Fowler, one of the 22 "unbiased" experts on the Department of Energy's 1989 Cold Fusion Panel, has learned few lessons about cold fusion since 1989. The symptoms of latter-stage *paradigm paralysis* are all too evident. This is what Fowler. says about cold fusion in *The Fusion Quest* in 1997:

p. 8 "...the only way to bring about fusion is to create circumstances in which the deuterium and tritium nuclei are moving toward each other at sufficient speeds to overcome their mutual repulsion and allow a close collision, so that nuclear forces can take over. Since motion (or, more precisely, random motion) is heat, fusion is only likely if the deuterium-tritium gas mixture is very hot—at a temperature of many millions of degrees. The recent "cold fusion" attempt to sidestep the need for high temperatures claimed a different mechanism for getting nuclei together, but so far this idea, and almost all other such ideas, have proved to be vain hopes. A genuine exception is "muon catalysis," involving the use of subatomic particles called "muons," artificially created by particle accelerators, to enhance the fusion rate, but this has not yet seemed sufficiently feasible to attract much attention. Thus all serious fusion research must do it Nature's way, by creating on Earth the extremely high temperatures that caused fusion to turn deuterium into helium at the beginning of time."

p. 126 "Within a month [*of the Pons Fleischmann announcement—EFM*] I had been drafted at the annual meeting of the National Academy of Sciences to serve on a panel that the Department of Energy had called together to investigate the claims of Pons and Fleischmann. By now there were many doubters who had tried unsuccessfully to reproduce cold fusion, and the experimental evidence offered to our committee by cold fusion's proponents was crude and unconvincing For me, the clinching point was the absence of the two byproducts, tritium and helium, that would be expected to occur simultaneously from the fusion of pure deuterium. Without some convinc-

Continued on page 80

New Energy Times Archive

CHAMPION OF AETHER ENERGY:

The Robert Adams Story

By Lenora Anderson

"History has shown time and again that important scientific discoveries generally happen only when someone steps outside the limits of his traditional discipline and looks at something from a fresh point of view. Then, what should have been obvious all along comes into focus."

Capt. Edgar Mitchell, Apollo astronaut

Dr. Robert Adams in his New Zealand laboratory (1993)

The innocence of a nine year old boy enabled him to see beyond the limited world view of the science of his day, and he's still at it. Some sixty six years later, almost every waking moment is spent exploring new possibilities for mankind, even the "impossible" ones. The Adams/Aspden Over Unity Motor / Generator, UK Patent No. GB 2,282,708, [Ed. Note: See *Infinite Energy* Issue #11.] is but one of many beneficial discoveries and inventions resulting from the lifelong efforts of New Zealander Dr. Robert George Adams, a slender man with twinkling eyes and remarkable energy.

Adams spent his boyhood in the small coastal town of Hastings, New Zealand, where he was born in 1920. As a boy, he was fascinated by wireless (the word radio was not yet in use), so he gathered wires, crystals, and coils and built himself a primitive crystal set, which he hooked to a simple aerial system. To his surprise, it worked! But how? Where was the energy coming from? If the broadcasting station was the source, as he was told, how could unlimited numbers of crystal sets and wireless sets tap this energy without using it up? There must be another source... And so at age nine Adams began his life's work with the mysteries of aether energy.

As Adams tells it:

"At the age of thirteen in 1933 I first started asking questions about the aether energy/force. I was perhaps fortunate that I was given a very old book on wireless in 1933 by a friend of my father; it was a huge red coloured hard-backed book on early wireless and its title was simply *Wireless* and was published in the United Kingdom in the twenties. Before I was to receive this book however, my biggest question to my peers of the day was, 'How could the low-powered old transmitters of the day provide enough energy for so many tens of thousands of wireless sets and crystal sets alike if, as is claimed, the energy transmitted diminishes as the square of the distance from point of transmission?' None of my elders or peers could give me a satisfactory answer. However, in time, after much study, this beautiful old *Wireless* book did. It contained a detailed chapter about the AETHER. I had studied and wrestled with this chapter time and again until quite suddenly I found I had the answer to my most salient investigative factor pertaining to wireless. From there on I was to soon figure out that what the MAINSTREAM of wireless books were teaching in relation to magnetics, induction, and wireless transmission was not correct.

"Then followed my studies of the then early and vague descriptions of the atom, electrons and protons, etc., from which I quickly learnt that all matter, particularly metals, all inhibit by nature a magnetic radiation field, and here was the rest of the answers to my probing questions, particularly to magnetism. I have, since boyhood, disbelieved that it is primarily the energized coil that causes/creates the resultant inductive field in a magnetic system."

In 1933, Adams invented the solid-state amplifier. He used cat's whiskers to connect two quartz crystals, powered from two 1.5 volt and four 1.5 volt cells, respectively, and connected these to the output of a crystal set, subsequently driving a loudspeaker (forerunner of the modern transistor and silicon chip.) Unfortunately, 13 year-old Adams did not realize the potential of his invention, and the world had to wait a bit longer.

One year later, he left school and began an apprenticeship with the local wireless company, where he worked for five years. During this time he completed an ICS correspondence course in electricity and wireless. He left home at 19 and travelled to New Zealand's largest city, Auckland, to advance his experience. His plans changed suddenly with the outbreak of WWII, and Adams was drafted into the NZ Army. When the Army realized his background, Adams was then transferred, suddenly and without notice, to the Air Force Communications Wireless School in Auckland. After his discharge from the Air Force, he studied science and mathematics at Auckland's Seddon Memorial Technical College. He then completed, in two years, a five-year course in broadcasting station design, installation, operation

New Energy Times Archive

and maintenance at the NZ Radio College.

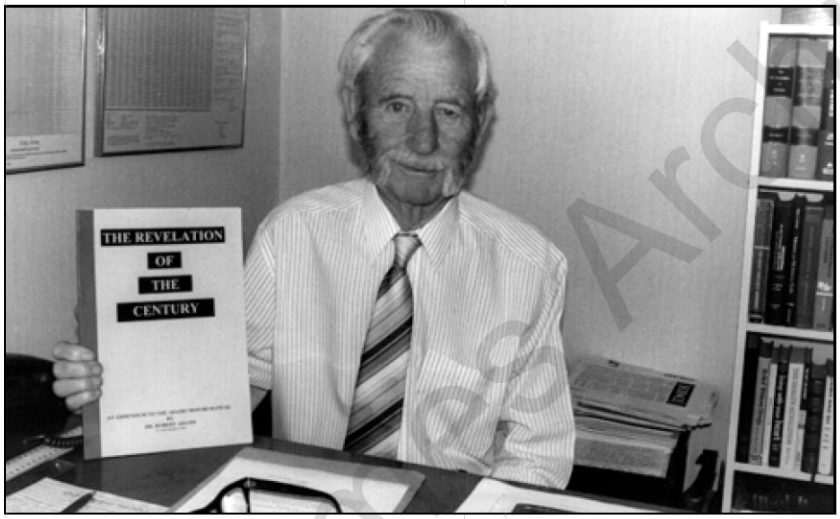
Adams was working in the assembly plant of an electronics company by the time the war ended. He was soon made production supervisor, and by age 27 Adams became a design engineer. For the next three years he was engaged in technical and engineering work in broadcasting stations. His work for various electronics companies covered a period of 18 years.

At 43, Adams formed his own company, designing, manufacturing and installing electronic equipment; the year was 1963. That year, he invented the loudspeaker inter-communication telephone system; within three months he had secured a contract from Air New Zealand for a complete intercommunications system to cover Auckland International Airport facilities. He also invented the plug-in printed circuit solid-state module/board now in common use in all modern electronic equipment. Industrial electronics control equipment, computers, telephone exchanges and communications equipment are but a few of the hundreds of applications for this invention. Then came the hybrid push-button telephone dialing system using electronics, with Strowger switching for line selection. Regrettably, Adams was unable to access the required components due to the import restrictions at that time, and could not realize his plan to incorporate this into the Air New Zealand contract. Had this advance in communications been pursued then, modern telephones would most likely have been on the scene many years earlier.

In 1965, Adams was recognized with membership in the Auckland museum, and subsequently became a member of the Royal Society of New Zealand.

1968 and 1969 were also eventful years for Adams. He was a co-founder of Radio International New Zealand Limited, still in operation as Radio Pacific. He became his country's first consulting engineer in the field of broadcasting, and in 1968 published a broadcasting engineering manual covering station design, installation, operation and maintenance. On May 29th of that same year, Adams founded the New Zealand section of the Institute of Electrical and Electronic Engineers, Inc., New York (IEEE). He was subsequently elected chairman of Region 10 NZIEEE, and served a two-year term. 1969 saw him elected fellow of the New Zealand Electronics Institute. During this time Adams also began his association with Air New Zealand, designing and commissioning communications equipment for them. Additionally, he worked on equipment installation for several hydropower stations in New Zealand.

With the invention of the Adams Switched Reluctance Motor/Generator in 1969, Adams worked in his home laboratory on motor design, research and development, and many more interesting discoveries resulted. In 1970, he found a way to harness the collapsing field in an electric motor, and later, in 1975, discovered pulse charging, a superior method of charging batteries. The following year, he was surprised to learn that magnets of higher energy product replacing those of lower energy product do not increase the efficiency of an electric motor. (Ironically, this discovery does not appear to pertain to the Adams/Aspden Electrical Motor Generator.)



Dr. Robert Adams with his *opus magnum*—Courtesy Eastern Bay News, New Zealand

Adams "retired" in 1980, but he didn't change his focus or slow down. Instead, he continued at his relentless pace, researching aether energy and motors and generators which harness it, and achieving spectacular, indeed "impossible," results.

In 1993, he developed a procedure to engineer magnetic pole reversal. Later that year he discovered an increase in the radiation pattern from the negative-energy, negative-time region of magnetic polarity reversal and the consequent radiation pattern measurement. This was also the year that Dr. Harold Aspden contacted Adams, and the collaboration which has since resulted in the Adams/Aspden Over Unity Motor Generator began.

In 1995 came the Adams Super Power Four Pole Permanent Magnet, which can hold 420 times its own weight. Dr. Adams had theorized for years the existence of four, rather than two, poles interacting in any magnet. He was now able to engineer magnets into forming four poles, quadrupling the energy. Such a rectangular or cube magnet becomes a unit consisting of four twin poles, each face containing a north and a south pole, separated by a zero vortex in the center of each of the four twin poles, and all displaying similar energies. The energy found on the edges of each of the four faces is very high — 25 per cent of the total energy of the full face. His present lab magnets are approximately 3/4-inch cubes, weighing only 60 grams. The edge of any face will hold a five kilogram iron block in mid-air. When the face of the magnet is attached to metal, a force of 25.25 kg is required to release it.

From his observations of certain laboratory experiments with ball-bearings, Dr. Adams concluded that electrons circulate in conjugate pairs and have a spin opposite to that of rotation, and that the spin is four times greater than that of the orbital rotation. He has demonstrated that space/gravity energy can be concentrated, focused and/or magnified by permanent magnets. Furthermore, this energy is not difficult to harness, and is clean, non-exhaustible and free.

By the end of 1995, Adams had invented the Mark 022 Thermo Switched Reluctance Motor, and was granted full membership in The Scientific and Medical Network of the U.K. 1996 held other joys for Adams. He completed building his Mark 022 Thermo Switched Reluctance Motor. In November, Adams was pleased to accept an honorary Doctorate of Science offered him by the Open International University for Complimentary Medicines of Colombo, Sri Lanka, in recognition of his lifelong dedication to the field of discovery and invention. He was also delighted over the granting of UK Patent No. GB 2,282,708 for the Adams/Aspden Over Unity Motor Generator.

Currently, Dr. Adams is involved in the development of the 024 Thermo Motor; also in line for development is an invention that will make solar cells as applied to vehicles and boats obsolete, as well as another revolutionary electric motor generator, not yet named. Both of these projects remain classified at this time.

In October 1996, a group of Adams supporters founded the *Robert Adams Foundation Trust for Scientific and Academic Research*. The Foundation

New Energy Times Archive

hopes to help realize the potential of new energy technologies through three main directives: to provide ongoing research and development funding for clean and economical energy solutions, to establish a learning facility which will provide a supportive environment for understanding and applying emerging scientific research, and to create a support structure to assist in the restoration of damaged eco-systems. The Foundation welcomes your support, and can be contacted by mail at PO Box 2174, Kopeopeo, Whakatane, New Zealand.

Dr. Adams has two publications, available in New Zealand. The Adams Motor Generator is available from PO Box 34735, Birkenhead, Auckland, ph/fax 64-9-416-7320, and *The Revelation of the Century: An Addendum to the Adams Motor Manual*, from Adventures Unlimited, 221 Symonds St, Auckland, New Zealand, ph 64-9-373-2002, fax 64-9-373-2112.

The author acknowledges the kind assistance of Dr. Robert Adams and Cptn. Bruce Cathie's book, *The Harmonic Conquest of Space*, Nexus, Mapleton, Queensland, Australia, 1995, pp. 133-143.

SPECIAL REPORT ON A REVOLUTIONARY NEW MOTOR GENERATOR:

THE ADAMS THERMO MOTOR GENERATOR -- MARK 022/3

by Dr. Robert Adams

There is overwhelming evidence that ether/space energy can be concentrated, focused and/or magnified by permanent magnets. I, for one, have proved this in my original motor generator, 4-pole super power magnets, the Adams Thermo Motor Generator, and other inventions and electromagnetic discoveries not yet disclosed. My success in precipitating heat from ether/space energy manifesting within the stators of the MARK 022/3 ADAMS THERMO ELECTRIC MOTOR and successfully harnessing this energy has proved to be a very significant and exciting event for a world starving for clean, economical energy. The Adams Thermo Motor Generator is but one of the new energy devices on the horizon with enormous potential. The name chosen illustrates the device's ability, in addition to supplying very efficient electrical or mechanical power, to also provide water heating, both at unprecedented economical figures.

Heat is a source of immense energy loss in conventional motors. This was the principal factor which first prompted me to invent a motor that would overcome this energy waste; in 1968, the original Adams Motor Generator Mark 001 was born. Ironically, in contrast, over the intervening years much of my mental research went into the idea of tapping ether energy, in the form of heat, into my original machine. With this task most prominent in my mind, I constantly pondered over the idea of inventing a motor that would, in addition to rendering a very high degree of efficiency, provide etheric energy in the form of heat within the machine, which I could then harness by way of heating water.

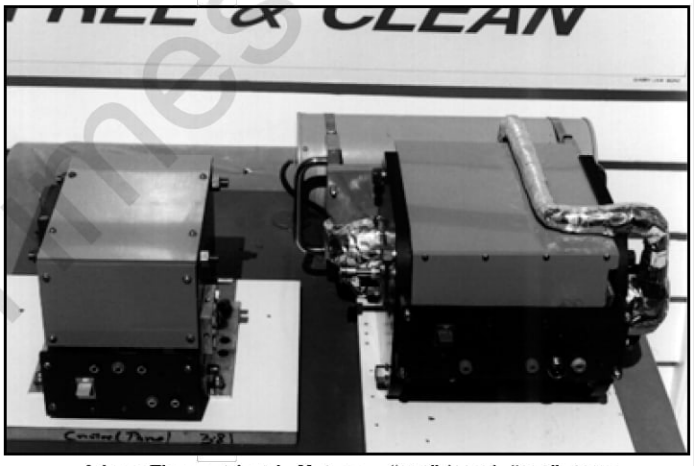
I constantly pondered over the idea of inventing a motor that would, in addition to rendering a very high degree of effficiency, provide etheric energy in the form of heat within the machine, which I could then harness by way of heating water.

Through the years I found little chance of improving the lot of electric motor stator systems, as has been attempted by many, with most only showing little, if any, improvement in efficiency. Instead, I felt a pressing message to direct most of my efforts in the design of a unique rotor. Two unique engineering factors came to mind quite quickly and were duly implemented into this rotor. The results of the first trial runs were well beyond my expectations; for the size and electrical parameters of the machine, the energy gated from the ether in the form of heat was massive and spontaneous. These results were very exciting.

To construct a machine of this kind requires considerable experience and skill in the design of unconventional new energy devices, in addition to the requirement of experience in the science of thermodynamics, calorimetry, and water heating systems. All measures must be exercised to preclude or reduce losses, as these are many and can be high, and include the following: conduction, radiation, windage, bearings, magnetics, transistor switching, high windage loss at stator pole faces due to high speeds of 2500 - 4000 rpm of the rotor causing considerable cooling effect, i.e., irretrievable loss of ether energy, and thermo insulation losses in stator jackets, holding tank and piping circuitry.

The unique rotor, briefly described, is comprised of four neodymium magnets. It is driven by only two 180 degree stators with a large air gap of 1.25 mm, has a rotor diameter of 140mm and is 19mm in width; the stator faces are small, at only 15 mm diameter.

The high heat energy referred to, gated from *ether /space*, concentrates at the stator windings. The manner in which this heat energy is harnessed from the stator is unique and very efficient; the result is a machine which develops mechanical power for industrial use and provides hot water in addition—a world first in its class.



Adams Thermo Electric Motors — "024" (1997), "023", 1996

It represents a boon to industry, hospitals, institutions and domestic dwellings alike. For any particular application it can be designed for power supply generation in addition to providing hot water at undreamed of economy. The applications are endless, and for the consumer the big bonus is its sheer economy, whether you take a small power boat or an ocean-going vessel—fuel cost and weight would be slashed to the bone and fire risk greatly reduced. The same benefits would apply to hospitals, production plants, mills, mining and industry in general.

The volume of such a machine, because of its unique free water heating advantage, will of course be greater than that of a conventional motor due to the installation criteria of the associated componentry required to harness this primary source of free energy.

We are now in a position to harness these energies from magnetic forces, and have a vast new clean source of energy, free for the taking.

New Energy Times Archive

TEST RESULTS

Calorimetric Test, Transistor Switch Dissipation, and Electrical Input and Ether Energy Output, Observed July 14, 1996 in my Whakatane, New Zealand Laboratory

Total Transistor Switch Dissipation.....45 watts
Total Electrical Input.....33 watts
Ether Energy Output of Hot Water.....137 watts

45 watts of transistor switch is the total dissipation of both the machine and switch, so we are faced with a paradox: electrical calculation total input power = 33 watts versus 45 watts of the transistor total input (calorimetrically measured). To me, this indicates that etheric energy is somehow entering the switching circuit, as it gets far hotter than it should for the amount of current it is switching. This possibility should not be ignored, as etheric energy moves and collects on both insulators and conductors alike and collectively in a manner totally foreign to the way in which electricity, as we know it, flows in an electrical circuit.

UNLOADED PERFORMANCE TEST -- It is to be noted that the outlined test run was carried out free- running, i.e., the machine was operating without mechanical or electrical load applied. On application of loading, however, input power increase is minimal, where ether heat energy increases dramatically in proportion.

A new machine of higher power, greater dimensions and of anticipated improved efficiency is, at present, under construction. The results of its performance will be interesting to see and will be published internationally in due course

RECOMMENDED READING

•*MODERN AETHER SCIENCE* and *PHYSICS WITHOUT EINSTEIN*, by Dr. Harold Aspden, Saberton Publications, PO Box 35, Southampton SO16, 7RB, UK

•*THE COSMIC PULSE OF LIFE*, by Trevor J. Constable, Borderland Sciences Research Foundation, Gaberville, CA, USA ISBN 0-945685-07-6

•*THERMODYNAMICS AND FREE ENERGY*, by Peter A Lindemann 28 Williams Boulevard, Edgewood, New Mexico 87015, USA

This article is included in my publication, *THE REVELATION OF THE CENTURY: An Addendum to the Adams Motor Manual*, available from Adventures Unlimited, 221 Symonds St, Auckland, New Zealand. 64-9-373-2002 ph, 64-9-373-2112 fax.

***T. K. Fowler*, continued from Page 66**

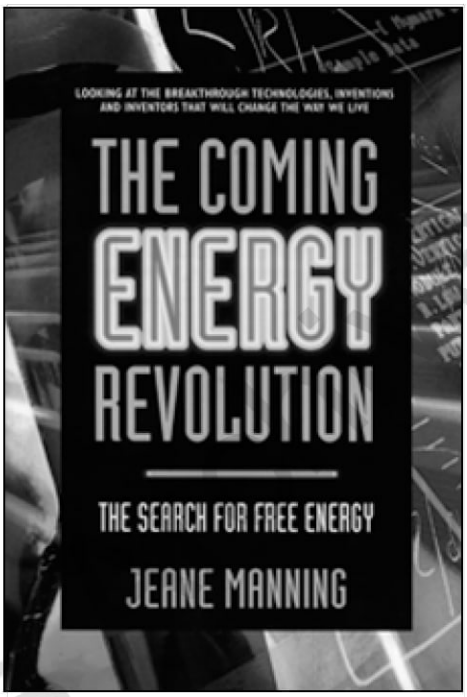
ing evidence of a nuclear process that could produce vast amounts of energy, the other claims of intense heat produced by the reaction were unlikely to be of much interest, as Pons and Fleischmann themselves had apparently-appreciated in postulating a fusion origin for their observations."

"Our committee was negative about cold fusion, as is well documented in our report and in a later book by the committee co-chair John Huizenga, of the University of Rochester. Though a few scientists and a coterie of other enthusiasts have continued to claim otherwise, as far as I can tell the overall conclusion that cold fusion is an illusion still prevails, though I confess I have not been motivated to pay much attention lately. I did, however, experience first hand the excitement that cold fusion has engendered among believers when, as late as April 1994, a young congressional aide, whose eyes had glazed a bit as I tried to explain the tokamak, eagerly pressed into my hand a new cold fusion magazine published by a constituent back home."

[**Editor's Note:** The Congressional aide was working with Congressman Dick Swett of New Hampshire, and it was *our* magazine he was talking about!—the first incarnation of *Infinite Energy* (a magazine exclusively on cold fusion, financially ruined after three stellar issues by an unscrupulous, nearly bankrupt publisher.]

p. 174 "One might might have thought, therefore, as some advisers to the fusion program used to assume, that the actual demonstration of fusion energy production at Princeton beginning in 1993 would have opened the door to the U.S. Treasury....."

So Dr. T.K. Fowler, having no thought that there could be something new under the sun—i.e. nuclear reactions in the solid state and excess heat without commensurate lethal radiation — not following the scientific literature on cold fusion, and not following cold fusion developments in general, still has the unmitigated gall to suggest that he is qualified to suggest that cold fusion is "an illusion." Cold fusion investigators are "enthusiasts," but on the other hand what we learn Fowler to be enthusiastic about is "opening the door to the U.S. treasury" for his hot fusion research— based on the now radioactive TFTR tokamak hulk at Princeton. The world, desperately needing clean, abundant energy has suffered the dangerous ignorance of such as Dr. Fowler far too long. ***—EFM***



... THE REVOLUTION IS COMING!

The Coming Energy Revolution

by Jeane Manning

1996, published by Avery Publishing Group, Garden City Park, New York
230 pages, illus., resource list, glossary, indexed, ISBN 0-89529-713-2.

$12.95 + $3.00 AIR MAIL (US AND CANADA)

$12.95 + $7.00 (OTHER FOREIGN)

NOW AVAILABLE FROM

COLD FUSION TECHNOLOGY
P.O. BOX 2816
CONCORD, NH 03302

AND DON'T FORGET. . . .

READ

FIRE from ICE

New Energy Times

Fleischmann-Pons Patent *May* Be Doomed in the U.S.

Infinite Energy learned the disturbing news that last May ENECO of Salt Lake City has abandoned its efforts to battle the U.S. Patent and Trademark Office (USPTO) over the Fleischmann/Pons Cold Fusion patent application of 1989. This action followed what ENECO's CEO Fred Jaeger termed the USPTO's "*final* rejection" of the F/P patent application.

Jaeger released this formal statement: ***ENECO has now completely re-directed its business plan and internal development activities around its own proprietary technology and milestone program. In late May, the Company terminated its exclusive license agreement with the University of Utah regarding the original 1989 Pons-Fleischmann electrolytic patent applications. The timing of the decision to cancel the license was driven by the U.S. patent office's final rejection of the licensed applications. The only recourse for ENECO, as a licensee, was to pursue an expensive appellate process at an estimated cost in excess of $1 million over the next 2-3 years The combination of high legal costs and other technology issues associated with the original patent applications, caused the Company to terminate the license in order to devote full corporate resources towards itS own technology that is believed to have a quicker route to commercial success.***

So ENECO has returned to the University of Utah its worldwide license for the F/P patent application, to which it had paid hundreds of thousands of dollars for exclusive worldwide rights. The Technology Transfer Office of the University of Utah is now searching the cold fusion community for a party or parties willing to take up the battle against the USPTO, which has been going on since 1989.

The intensity of that battle can be seen by referring to examiner Harvey Behrend's rejection of another U.S. cold fusion patent application, profiled in Issue #11 of *Infinite Energy*, pp.48-51. Among other unusual techniques used in Behrend's rejection of that and other cold fusion patent applications—such as the use of popular media accounts of cold fusion from 1989 and 1990— is reference to highly questionable MIT Plasma Fusion Center data on its "null" cold fusion calorimetry experiments in 1989. This data has been questioned for its integrity by MIT graduates Dr. Eugene Mallove of *Infinite Energy* and Dr. Mitchell Swartz. Swartz's patent applications on cold fusion have also been fought by the USPTO.

According to Jaeger, the only action now available to ENECO would have been to enter the extremely costly appeals process, with no certainty of a positive outcome. Jaeger said that the first step of the process would be to the Patent Review Board, which ordinarily "rubber stamps" the actions of the patent examiners. This action itself, Jaeger stated, would cost many thousands of dollars. But the really big legal expenses could come, he said, in going to the next level of appeal—the U.S. Sixth Circuit Court. Jaeger said that the specialized legal representation required to fight for the F/P patent application "all the way up" could easily cost $1 million. ENECO, he said, was not prepared to propose such an expenditure to its Board.

Jaeger stated that if no appeals filings are made before sometime in the fall of 1997, the Fleischamann-Pons Cold Fusion patent application will be dead forever in the U.S. Jaeger further stated that no post -1989-1990 scientific data confirming cold fusion products and excess energy could be used in the appeals process.

The University of Utah Technology Transfer Office has conducted a broad mailing to the cold fusion community in search of support. A letter from Director of that office, Dr. Chris Jansen, arrived at *Infinite Energy*, which prompted our call to ENECO to find out what was going on. Jaeger emphasized that it was *not* the recent challenge by CETI of the effectively *approved* F/P patent in the European Patent Office (see *IE*#12) that prompted ENECO to abandon the F/P patent in the U.S.

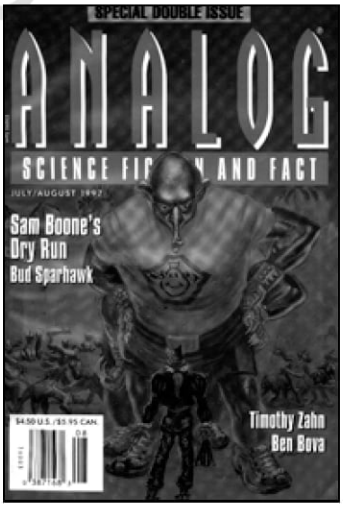
Gene Mallove on the Art Bell Show

Infinite Energy Magazine's Editor-in-Chief appeared for *four hours* on the Art Bell synidcated radio talk show, begining at 2:00 a.m. eastern U.S. time on June 11th. The show ended only two hours before ABC TV*Good Morning America* featured the CETI water heating technology and radioactivity remediation process. Thus, millions of listeners, alerted to the impending GMA program by Mallove and Art Bell, could view the remediation demosntration on nation television.

Mallove has appeared on many dozens of radio programs in the past six years, but perhaps never before such a large and highly receptive audience. Numerous subscriptions and requests for information have come in following that appearance with Art Bell. Mallove has been on the Laura Lee show (syndicated out of Seattle), on the Dr. Bob and Zoh Hieronimus shows (in the Baltimore, Maryland area), more recently on the Stan Solomon Show, and many, many talk radio stations in local markets from California to the east coast.

ANALOG Science Fiction and Fact Features Cold Fusion

One of the most popular science fiction/science fact magazines, read by a broad spectrum of future-looking individuals—many of them scientists and engineers, recently featured a 6,000-word overview of cold fusion by Eugene Mallove. The body of the 21-page article in the *Special Double Issue* (July/August 1997) was accompanied by a list of technical and popular references. We are most grateful to Analog editor Dr. Stanley Schmidt for publishing this lengthy and informative piece. For those of you unable to access the Analog article, *Infinite Energy* purchased a supply of the July/August issue. For North American readers, send $10.00 and Dr. Mallove will send you a personally signed copy. (Orders from elsewhere, please remit $15.00).



Dr. Eugene F. Mallove

COLD FUSION: THE "MIRACLE" IS NO MISTAKE

It's simply not true that "nobody's doing cold fusion research any more" or even that "nobody's getting results." Here's a summary of what's been happening, and a chance to check it out for yourself.

There is something very new under the Sun. The worst nightmare of the aging nuclear physics establishment has come true: there is far, far more to nuclear reactions than "was ever dreamt in its philosophy." The class of heretical, near room-temperature nuclear phenomena, dubbed "cold fusion" since the flamboyant Utah announcement of March 1989, are now confirmed and are beginning to be commercialized. The acid test for any revolutionary discovery—entry to the marketplace—is happening right now for cold fusion, whether or not the critics

DR. EUGENE F. MALLOVE 53

New Energy Times Archive

Huizenga Blinks —*AGAIN!*

In Issue #12 we featured the story of how Dr. John Huizenga, former DOE Cold Fusion Panel Co-Chairman, and arch-enemy of cold fusion research had come to the California Polytechnic University, Pomona to hold a colloquium for the Physics Department. Its brazen title, "The Cold Fusion Fiasco," promised a repeat performance of Huizenga's well-known litany of accusations that cold fusion is "pathological science." He delivered.

This was a Physics Department, mind you, in which two cold fusion pioneers—Professors Robert T. Bush and Robert Eagleton—continue to work and publish results. The talk was arranged by the head of the Physics Department, without consulting Bush and Eagleton. Professor Bush, in his article for *Infinite Energy* describing the Huizenga visit, pointed out that Huizenga declined, when invited by him to take calorimetry data on a working excess heat-producing cell. Huizenga stated, according to Bush, that he had other work to do in his retirement—he was on his way after the colloquium to Lawrence Livermore Lab. Bush had told Huizenga that "if he could find an error in his work leading to a significant spurious excess power, Bush would not spend another minute on cold fusion." Huizenga did not take up the challenge. Huizenga, who does not subscribe to *Infinite Energy*, but who is obviously informed of our activities—or finds the magazine at the small number of finer magazine stores that occasionally display *IE*— sent us the following letter from his place of retirement in Pinehurst, North Carolina:

July 7, 1997

Dear Dr. Mallove:

Your readers are entitled to know that your cover story (IE, 2, January-February, #12, 1997) stating that R.T. Bush "Makes John Huizenga blink" is a total fabrication. The insinuation that Bush's "cold fusion claims" favorably impressed me is completely false. Such shabby journalism is inexcusable!

Sincerely,

John R. Huizenga

Astute readers will no doubt observe that Dr. Huizenga may be feeling a bit of excess heat in this matter, so to speak. Or, maybe it is that he is just excessively heated. Whatever the case, it is our pleasure to print his letter here. We *do* wish he would subscribe—if only for reference material for his expected future writings, which will be aimed, no doubt, at exhonerating himself for the negative role that he has played.

Let us set the record straight immediately. Dr. Huizenga, we got the story of what happened at Cal Poly completely accurately. It is *you* who are obfuscating.

Huizenga states that we "insinuated that Bush's 'cold fusion claims' favorably impressed" him. There was absolutely no such insinuation. We are well aware—painfully aware—that *no* cold fusion claims could impress Huizenga. He is far too dense and paradigm-paralyzed to let *one datum* of cold fusion experimental results from *anyone* penetrate his shield.

Bush *did* write, that "I could have sworn that I actually saw Huizenga blink!" Meaning, that it was an awkward situation for Huizenga (who was trying to politely decline Bush's offer)—not necessarily that he thought any of Bush's works was good. And we did title the article, *The Cold Fusion Cell that Made Huizenga Blink*—poetic license, but by no means stating anywhere that Huizenga is impressed with anything in cold fusion.

We merely proved, beyond a shadow of a doubt, that when challenged to do hands-on investigation of a cold fusion claim, Huizenga would decline—hardly the mark of a scientist interested in pursuing the truth. That is "blinking," *big time*. When compared with the rigor with which many of us have investigated—and demolished— the so-called negative results of places like MIT, Caltech, and Harwell, results which formed the basis for Huizenga's rush-to-judgement 1989 report, Huizenga gets an immediate "F"-grade on any scale. You see, Huizenga knows —or thinks he knows—that the scientific community and pack-journlsists are going to honor him indefinitely for "dispensing" with cold fusion. So he believes there is no sense in investigating any experimental claims. That dirty lab work in cold fusion is all beneath him—it always was and always will be. He still has not told us what errors the McKubre group at SRI-International, for example, has made in its gold-standard calorimetry.

Huizenga is engaging in the deluded thinking of a failed scientist, whose conclusions of 1989 and in following years were not just wrong—they were *catastrophically wrong, incapable of being modified, and will go down in history as one of the greatest scientifc travesties of all time.* That is a legacy that should make anyone blink twice.

Distinguished Professor John O'M. Bockris Retires from TAMU

TEXAS A&M UNIVERSITY
Department of Chemistry
College Station. Texas 77843-3255

June 16, 1997

Dear Colleague:

I shall retire from Texas A&M University on June 30, 1997.

My years in London, Philadelphia, Adelaide, and College Station, have been extremely fruitful in respect to research. The fruit has been due to the excellent collaboration and response I obtained from you and from my other collaborators.

This research has resulted in some 750 published papers and 29 books. The most significant work was that between 1989 and 1992 and resulted in the discovery of electrochemically produced tritium, helium, and metal-metal transmutation, in the cold.

I am fit and eager. My work on low temperature nuclear reactions brought me into contact with other anomalous phenomena and made me realize the limitations of the present physics. My future work will be in the direction of anomalies, not only in chemistry, with the intention to contribute to the change of paradigm in the sciences which is so clearly needed.

Many thanks to you!

Sincerely,
J. O'M. Bockris
Distinguished Professor of Chemistry

John, Live Long and Prosper! —Gene

www.Energy-Times.Archive

"Energy INFOcard"

Most recent annual data available as of 1/30/97
Source: Energy Information Administration, U.S. DEpartment of Energy.

Units:
MMbd = million barrels per day
Mcf = thousand cubic teet
tcf = trillion cubic feet
kWh = kilowatt hour

Btu Equivalents: *1 bbl crude oil: 5.8 million; 1 Mcf gas: 1.03 million; 1 kWh electric: 3.4 thousand; 1 ton coal: ~22 million;1 gal. gasoline: 125 thousand; 1 cord dry hardwood: 21.5 million*

United States (1995)

PETROLEUM

Production (crude oil, NGPL)(MMbd)	8.3
Net imports (crude oil & refined products)(MMbd)	7.9
Other sources (refinery gain, alcohols, other)(MMbd)	1.5
Consumption (26% of world total) (MMbd)	17.7
Dependence on foreign oil (net imports/consump.)	44%
Recoverable resources (yrs of current production)	74
Share of US oil consumption for transportation	67%
Real world oil price (1995$/bbl) 1981 (peak):$60	1995:$17

NATURAL GAS

Production(dry gas) (2nd in world to Russia) (tcf)	18.6
Consumption (28% of world total) (tcf)	21.6
Consumers: industrial (*incl. lease, plant, pipeline fuel*)	49%,
residential 22%, commercial 14%, electric utilities	15%
Share of consumption from Canadian imports	13%
Recoverable resources (yrs of current production)	75
Real wellhead price (1995$/Mcf)	$1.59 vs. $3.80 in 1983

COAL

Production (2nd in world after China) (billion tons)	1.03
Share produced West of the Mississippi	47%
Share produced from surface mining	62%
Exports as percent of production	9%
Electric utility share of consumption	88%
Productivity: 5.4 tons/miner-hour(1995) vs 2.1 t/m-hr	(1964)
Recoverable reserves (yrs of current production)	250+

ELECTRICITY

Utility net generation (trillion kilowatthours)	2.99
Coal 55%, Nuclear 22, Gas 10, Hydro 10, Oil 2,other	*1%*
Nonutility net generation (billion kilowatthours)	362
Gas 56%, Coal 15%, Wood & Waste 15%, Oil 5%, Hydro 4%, Geothermal3%, Wind 1%, Other 1%	
Sales: residential 35%, commercial 28%, industrial 34%	

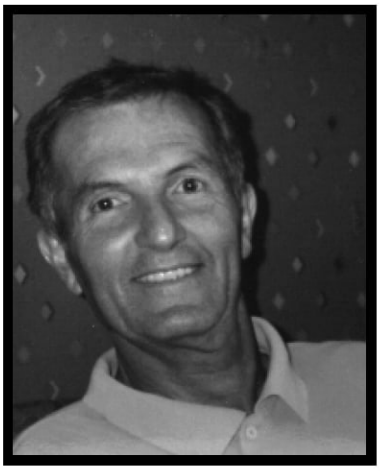
Emissions (million tons)	CO_2--2541, SO_2--13, NO_x--9		
Coal fired	73%	94%	80%
oil e gas fired	20%	4%	19%
Biomass fired	6%	2%	1%

NUCLEAR

Number of operable generating units	109
Capacity (million kilowatts)	99
Capacity Factor	78% in 1995 vs. 58% in 1985

RENEWABLE ENERGY

Consumption (quadrillion Btu)	6.9%
Hydropower 50%, Wood 34%, Waste 7%, Other(ethanol, geothermal, solar, wind) 9%	
Renewable share of total energy consumption	8%



Dr. Stefan Marinov —A Suicide

Word has been received of the tragic, apparent suicide of new energy researcher, Stefan Marinov. The police explanation is that Dr. Stefan Marinov killed himself, on July 15, 1997, jumping from the University of Graz (Austria) Library building (Bibliotheque).

We are glad that we were able to publish some of his last work (see *Experimenter's Corner, IE* #12.) and will be publishing more in the future. We are very saddened to hear that such a brilliant, intense man has left us, but we can still learn from him.

—Eugene Mallove

An Obituary Note about Stefan Marinov —Received from Dr. Robert Bass:

I was appalled by word of Marinov's suicide. For a professed Christian (about which he and I had corresponded) this is like saying, "OK, Lucifer, you win! I give up!"

Marinov, in my opinion, was a real genius in the sense that he very well understood all of the classical theoretical physics in great detail (sufficient detail to argue that historically some wrong turnings had been taken, and that Maxwell's Equations as we normally see them can be readily disproved by a *large number* of table-top Faraday/Ampere type of experiments) and yet was an exceedingly good experimentalist who invented and had built and tested a large number of *very* complicated electromechanical & hydro-electromagnetic devices & systems.

A native of Bulgaria (and former Assistant Prof. of Physics from 1960 to 1974 at Sofia University), on certain occasions in 1966-67, 1974, and 1977 he was forcibly confined to mental hospitals and given psychiatric "treatment" because of political dissent. In 1977 he got a passport and in 1978 lived in Washington, D.C.; later he lived in Italy and Austria. He was fluent in both English and German.

He was involved publicly with many quarrels with the Editor of *Nature* who refused to print either his papers or his Letters to the Editor. He retaliated by somehow securing the funds to place full-page ads in *Nature* expressing his frustration with the dogmatic attitude of the Establishment.

TOTAL ENERGY and EFFICIENCY OF USE

Total Primary Energy Production (quadrillion Btu)		71
Coal 31%, Gas 27%, Oil 23, Nuclear 10, Renewable		*9%*
Total Consumption (quadrillion Btu)		91
Coal 22%, Gas 24%, Oil 39, Nuclear 8, Renewable		*7%*
Decline in Energy/GDP ratio since 1973		1.7%/yr
Annual consumption per capita (million Btu)		345
US share of world energy consumption		24%
Number of households (million)(1993)		97
Heated by: Gas 53%,Elect.26,0il 12,Propane 5,Wood 3%		
Household vehicle miles/gallon:	1979(14.6)	1994(19.8)
H. vehicle miles traveled (trillions)	1979(1.1)	1994(1.8)

(Total stock of cars and other vehicles in household use)

WORLD (1995)

Primary energy production (quadrillion Btu)		361
Coal 25%, Gas 21%, Oil 39%, Hydro 7%, Nuclear 6%		
(Dispersed renewab/es, primarily firewood, are not induded)		
Energy-related carbon emissions:	1970	1995
OECD (18% of world population in 1995)	57%	50%
Rest of World	43%	50%
Crude oil production (million bbls/day)		62
US 11%, OPEC 43%, Persian Gulf 28%		
Electricity generation (trillion kilowatthours)		12.7
US 28%, W.Europe 20%, Japan 7%, China 7%, Russia 7%		
Nuclear share of electricity (selected countries):		
France 77%, Germany 30%, Japan 30%, UK 25, US 19%		
Share of world nuclear electricity generation (5 largest):		
US 31 %, France 16%, Japan 12%, Germany 7%, Russia 4%		
Retail gasoline price (regular, $/gal) (selected countries):		
Japan 4.15,Germany 3.94, UK 3.19,Mexico 1.11, US 1.07		

For further information, please contact:
National Energy Information Center
202-586-8800
or visit Web site: http://www.eia.doe.gov

New Energy Times Archive

He claimed to have seen in operation and learned the secret of the so-called "Swiss ML converter" or TESTATIKA electrical generator [which appears to get free energy from nowhere],which was discovered by Paul Baumann ("by inspiration rather than human effort"), who is the head of the 500-member Christian religious commune METHERNITHA in Switzerland, which says they generate most of the electricity for hundreds of people via such "perpetuum mobile" generators, which they are unwilling to share with this fallen world. He was supposedly the only member who did not live in the commune. He tried many times, but failed, to persuade them to share their allegedly great discovery with the remainder of mankind.

He wrote a book "Divine Electro-magnetism" [available from East West Affiliates in Austria at Morellenfeldgasse 16, 8010 Graz, phone (0316) 37 70 93, for $70 + S&H] giving his take on the flaws in classical EM as now taught and how allegedly "high-school level experiments" can flatly disprove some parts of it in favor of other versions buried in now- forgotten old literature before the present version was settled on and now handed down by the Establishment dogmatically.

He earned his living by being a groom for horses but he was a prolific writer & inventor in German and had a large following who subscribed to his journal *Deutsche Physik*. His targets were schoolchildren not yet brainwashed by the Establishment into accepting false but dogmatically-taught ideas.

He was dead-certain that he had disproved all kinds of dogmatically-taught aspects of conventional electromagnetism, (Lorentz-Ampere Force Law, speed of light, special relativity, ether, Michelson-Morley, etc. — sadly, my memory is hazy, so I may not be recalling his protests correctly).

In studying the first edition of his book, I found a mistake in vector calculus and wrote to him, but he sent me the second edition in which another mathematician had already corrected him.

He was one year younger than myself (I turn 67 tomorrow) but *seemed* much younger ("45 or 50") and was an extremely vital and extraordinarily magnetic /charismatic/ enthusiastic and attractive person. I met him in Denver more than a year ago and handed him $100 cash which I had owed him for the 2nd Edition which he had trusted me to pay but on which I was about a year late [though he readily forgave me]!). I can understand his being "worn out" by the utterly monolithic refusal of the Establishment to listen to his allegations that he had measured ether drift (or whatever) and found in it the rotation of the earth (i.e. some diurnal variation — or whatever, my recollection is hazy). Perhaps he had measured a diurnal variation in the speed of light; my memory is hazy. The one thing I remember is that the blueprints for his numerous devices all looked very professional & convincing and the photos of his devices looked like they had really been built, yet he had evidently also spent *many thousands* of hours on extremely complicated mathematical calculations in most of which I could find no mistake. (Few theoreticians are sufficiently versatile to be electro-mechanically creative experimenters!) He published detailed plans for a hydraulic-electro- magnetic perpetuum mobile and showed photos of it in operation, but nobody "important" paid the slightest attention to him. What a tragedy!

Sincerely,
Dr. Robert W. Bass

THE LAST PROTEST

Dear Mr. Erwin Schneeberger,

Thank you for letting me know on 28/8/1997 about the sad event. Please, accept some questions and comments from me, for I knew Stefan Marinov for over 20 years. He used to say I was his older scientific co-fighter and follower-friend. Stefan was with me in Athens, just 15 days before he died. At that time, nothing could make me suspect his early death two, weeks later.

Adopting the Police explanation that Dr. Stefan Marinov killed himself, on July 15, 1997, jumping from the University of Graz building —the Bibliotheque (Library), I would like to ask: why there was no press or news release?

I was the first to inform his son, Marin Marinov, on 31/8/1997 in Sophia about the death of his father— he asked me a similar question. "Why the police still did not inform me, for two weeks, after the death of my father?"

Stefan Marinov was known all over the world, half of the citizens of city of Graz knew him. Stefan Marinov's death, jumping from a public building, should had been the first news for the city of Graz, for half the people there will now look for Stefan and much more all over the world. Is it true that there is no press release in this case for the city of Graz?

Does it look like a cover up? Even, Mr Deisting who first informed us, found accidentally about Stefan's death from the librarian on the 25/8/1997.

Stefan had attempted unsuccessfully to kill himself in the past, in Paris, in an attempt to make a protest against scientific censorship and the indifference of scientific community.

Assuming that Stefan had chosen for himself, a public building, as the Library of the University of Graz, instead of his own high elevated balcony, apparently he did so for the same protest, however, not particularly for the University of Graz. He did so to protest against all universities and position occupied indifferent for the truth, scientists and salary receiving professors.

The authorities of the University, knowing Stefan and his continuous efforts to answer unanswered scientific questions for the last 20 years, apparently managed to cancel an annoying press conference or press release by the police, which they thought it would have caused to students all over the world to ask more questions which the Professors could not answer and Editors will not publish, like the lists of questions and problems Stefan used to send and never got an answer — other than the typical "Professor's" answer: "I am not a Specialist," "Do not get me involved," "I have no time..."

Who ever controls the knowledge of humanity and tries to stop human evolution by confusing the mass and public media should know that whatever they call Stefan Marinov's death, suicide or killing, they committed another killing— for Stefan Marinov was forced to kill himself, in order to protest against the control of scientific knowledge.

Just before the end of last century the authority of USA patent office issued a direction: "No more patents on electromagnetism will be accepted, for what ever was to be invented in electromagnetism, has already been invented."

At the dawn of the airplane revolution, scientific authorities, like the Academy of Science in France or the Royal Society with Lord Kelvin made the aphorism: "Machines heavier than air may never fly."

At the last part of our century for ten years (the decade of 1970) scientific institutions and public media were making repetitively clear via all means: "We are facing a disaster, Petroleum is coming to an end before the year 2000."

Now, they say "conservation of energy" is perfect, even they can not prove this "conservation" better than the point of errors present-day technology introduces - at least 1 ppm— masking error remains in all experiments, which is huge for planetary and astronomical scale. Instead, they want to say: Energy was violated only once at the beginning, only at the "Big Bang," and that this conservation will never be violated again in the future by all means! (not to allow humans to step to the next scientific evolution). They say the "Perpetuum Mobile" is not possible, only a crazy scientist may attempt it, even though they have no scientific proof for its non-existence, only the assumption that it has not yet been invented. This attitude is not science!

Apparently the sense and politics that the next step of civilization is coming, dictates these actions to stop or delay scientific evolution. However, It was the Teslas, the Wrights, the Marinovs who did not listen to the politics —and science advances despite the intentionally spread confusion.

Stefan, you left us, though you could work, dig into forgotten and forbidden research and produce more. However, you considered your protest more important. Be sure, we do not listen, too, to politics. Your example will give more energy to us. It was the best Perpetuum Mobile you made.

Sincerely,

Professor P. T. Pappas,

Markopulioti 28,
Athens 11744, Greece.
e-mail pappasp@ibm.com
tel: ++301-9010355
fax: ++301-9011620.

New Energy Times Archive

THE LAUNCHING OF THE CATALYST INSTITUTE

by Stephen Kaplan

At the end of June, a group of new science pioneers met in Los Angeles to launch *The Catalyst Institute* (CI), a non-profit corporation dedicated to supporting the work of pioneers in a wide range of new science fields. The following listing of the research areas the new institute is exploring reveals how far-reaching are its interests:

- **Toxic biohazards, with a focus on neutralizing radioactive waste**
- **Non-invasive technologies for sustainable and renewable energy conversion**
- **Structured water and its uses in healing**
- **The relationship between electricity and gravity**
- **Exploring the use of light, sound, and geometry**
- **The unity of consciousness and matter**
- **Modern science and ancient shamanistic teachings**
- **Remote and fifth-dimensional viewing**
- **Phenomena beyond the electromagnetic spectrum**

Many of these areas were explored with much enthusiasm by a varied group of scientists and environmental activists during a group of seminars set up by one of the Institute's co-founders, Linda McClain, who hosted the gathering at her comfortable Grenada Hills home. Although their backgrounds were diverse, the participants shared a common excitement about theories and technologies unexplainable by mainstream science, and a devotion to the healing of the Earth and its inhabitants.

What follows is my summary of some of the major ideas and projects introduced by the scheduled presenters, my sense of the underlying energies of the meeting, and my views regarding the future of the new Institute. To introduce myself, I am a researcher, writer, and activist who has been engaged in the politics of peace, social justice, and ecological sanity for a number of years. Currently, I am conducting research into and writing about what is happening on the frontiers of new energy research and development.

What was immediately striking about the kick-off meeting of the *Catalyst Institute* was the spirit of egalitarian sharing of ideas and workload that everyone mutually created. Unlike many scientific meetings, this was held informally in a private home, with meal preparation and cleanup shared by the participants. Half of the participants stayed at Linda McClain's home, while others commuted from motels or area residences. These economies were necessitated by *CI*'s meager budget, but rather than being a disadvantage, the sharing of limited resources and work assignments helped to create a camaraderie that stimulated relaxed synergy in the flow of the discussions. Participants exchanged ideas with a level of excitement and openness that is rarely found in the usual scientific forums.

Hal Fox, a pioneer in the new energy movement who edits *New Energy News* and *The Journal of New Energy*, initiated the discussions. Fox presented an excellent overview of developments in cold fusion and other new energy technologies, as well as related research on the remediation of nuclear materials. He referred to the 200 laboratories in 30 countries which have replicated the original Pons / Fleischmann cold fusion experiments; the $100 million investment in cold fusion by the Japanese; and the current work of Ken Shoulders and the Neal-Gleeson team in Cincinnati, both of which hold very real promise of being sources of both over-unity energy production and processes for reducing the radioactivity of nuclear waste. He also discussed the promising Patterson fuel cell, which was highlighted on ABC's *Good Morning America* program on June 11, 1997.

Fox claimed that within a year the developers of these new processes will be able to demonstrate to the Department of Energy (DOE) that there are feasible approaches to solving the nuclear waste crisis. Unfortunately, current scientific advisors to the DOE have instilled the idea that it should only pay attention to old physics. As a result, the only solution to radioactive waste handling that is currently acceptable to DOE is long-term geologic storage, which is estimated to cost $2,500 *per year per kilogram* of radioactive material. The estimated costs of using new physics approaches to on-site removal of radioactivity is estimated at less than $2,000 per kilogram—a *one time* cost.

Ken Shoulders presented a fascinating history of the various phases of his research, ranging from his pioneering work in microelectronics in the 1960s to his recent work on the charge cluster type of electronic entity. He pointed out that during the electronics work with charge clusters, he discovered many indications of extreme energy release that could not be reconciled with the energy input used to form a charge cluster. Since beginning the charge cluster work in 1980, he hypothesized that the energy source might be zero point or vacuum energy. No convincing proof was ever found for this postulate, but strong proof was found for nuclear reactions produced by interaction with charge clusters. These reactions are the basis for patented processes for radioactive nuclear waste remediation and nuclear energy production. Shoulders concluded by pointing to the "outstanding mystery of vacuum energies," since the many effects he has discovered still seem too difficult to explain by nuclear methods only.

In the course of his presentation, Shoulders discussed the delicate relationship between pure research and subsequent development work, addressing in some detail the inefficiencies that are created by increasing the scale of operations. He is very much a person who values his solo work style, while still recognizing the necessity for collaboration under some circumstances.

John Hutchison, a Canadian inventor, is known for "The Hutchison Effect," which is shorthand for a number of strange phenomena that occur when he sets up powerful electrical fields with the use of Tesla coils and other types of generators. When the field is turned on, metallic and other objects levitate or are ripped apart. John presented a fascinating history of his research and discussed what is known and unknown about "The Hutchison Effect." He also discussed his crystal energy converter, a small device constructed out of commonly found materials that generates *anomalous outputs* of energy.

The weekend meeting dealt with a wide range of new science topics. The panel on water covered such subjects as structured water and its effect on health; Victor Schauberger's original theories on vortex energy, including the use of vortices in waste management, which were discussed by William Baumgartner; the use of special forms of light to neutralize radioactive elements; and the imprinting of subtle energies into water or on tapes, a new process created jointly by Yuri Kronopulo, a well-known Russian physicist, and Dong Chen, a Chi Qung master.

Dr. Brian O'Leary, an astrophysicist and former Apollo astronaut, presented a masterful survey of free energy developments around the world coupled with a plea for joint action to push through the barriers that stand in the way of full implementation of life-saving technologies. Barry Oser, a master musician, composer and inventor of new musical formats, spoke about his innovative approach to bringing the sounds of nature into urban environments, particularly his invention of a geodesic-domed spherical sound chamber that acts as a large musical instrument. Bill Witherspoon spoke about the subtle energy effects of Yantras and other large-scale art forms he has created in different natural sites. Kathleen Joyce presented an overview of the pioneering study of subtle energies by Wilhelm Reich, who developed theories and devices relating to

New Energy Times Archive

"Orgone Energy."

Fred Wood, the senior member of the weekend gathering, who once worked on the Manhattan Project, contributed an overview of new science from a systems theory perspective.

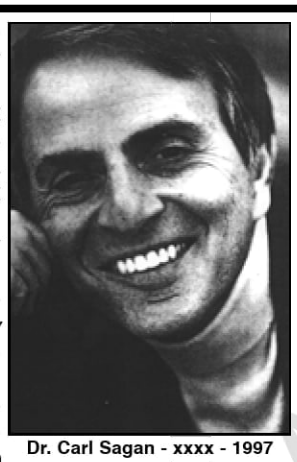
The *CI* gathering focused primarily on the creation of its first project: Bringing together our best knowledge and scientists dealing with reducing radioactivity in nuclear wastes. *CI* scientists have successfully demonstrated in their research ways to neutralize radiation in the various forms present in air, water, soil and biological organisms. The Institute plans to make a presentation on promising approaches to remediation of nuclear waste to a group of Russian and American scientists who will be attending a Conference for Progress and Coopera-tion, which will be held in late July to commemorate the 850th anniversary of the city of Moscow. Among the scientists present at the *CI* gathering who will be crucial participants in this effort are: Dr. Elizabeth Rauscher, a former UC-Berkeley physicist who has been a delegate and advisor to the United Nations on nuclear issues; Yuri Kronopulo; Dr. Tim Bender; Ken Shoulders, and John Hutchison. The final session of the weekend meeting were devoted largely to the best ways these scientists could communicate among themselves to prepare for the July presentation

Finally,*CI* is laying plans to become an educator of key participants in public policy making and the general public about the frontier research being carried out by new scientists. Town halls and Internet web sites were just two of the approaches under discussion.

Speaking personally, I was both amazed and heartened by what I learned at the founding meeting of the *Catalyst Institute*. The theoretical breakthroughs we discussed hold immense promise for bettering the life of all on this planet. The willingness of people from diverse fields and perspectives to work together, so well demonstrated at this gathering, also bodes well for us all. I am reminded of the end of Arthur C. Clarke's famous novel *2001—A Space Odyssey*, which depicts the newly created and fantastically powerful Starchild floating in space, near to Earth. The child didn't know yet what it would do next, *BUT IT WOULD THINK OF SOMETHING*. The same infinite destiny, say the founders of *CI*, awaits *us*.

Carl Sagan and Cold Fusion

by Eugene Mallove



Dr. Carl Sagan - xxxx - 1997

Astronomer and science popularizer Dr. Carl Sagan, who lost his battle against a virulent disease this year, could have been a major force for truth about cold fusion research. Unfortunately, despite my sending him scientific articles on cold fusion since 1991, plus *Infinite Energy* Magazine since its inception, Carl chose to remain undecided. (Carl knew me as an occasional correspondent from my work on interstellar propulsion and my published bibliographic studies of SETI —for which he was graciously supportive. The Planetary Society, which he founded, continues to sell *The Starflight Handbook*.)

In November 1989, just as the DOE was killing-off cold fusion with its rush-to-judgement travesty of a report, Carl delivered a firm warning to science journalists about their prospective coverage. It was very wise advice. ***Unfortunately, the science journalists largely ignored his wisdom and the world has been suffering ever since.***

In 1991, in *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* (John Wiley & Sons), I published what Sagan had said to the science journalists at their annual meeting in 1989—I had recorded his dinner speech on audio tape. Here is a *small part* of the section from *Fire from Ice* that deals with the topic of science journalism coverage of cold fusion. The lead-in narrative is my own, followed by Sagan's words:

From *Fire from Ice*, pages 270-271

The basic problem in cold fusion coverage in 1989-90 may have been that so much contemporary science is incremental and plodding in its accomplishments, that people ignore the longer historical perspective in which breakthroughs—paradigm shifts—do punctuate normal science.

The most obvious shortcoming of cold fusion reporting was the general media's loss of interest following their initial few months of intensive coverage. Cold fusion, like the man with the dog that could climb a tree, had had its glorious "15 minutes of fame." After *Nature* magazine and the DOE panel had rendered their negative verdicts in the summer of 1989, precious little was heard of cold fusion. Many science journalists simply bought into the *Nature*-DOE panel line and gave up. And why not? So thick had been the disparagement of Fleischmann and Pons and all their followers, that the mud stuck. It became "socially unacceptable" in the science journalism community to give too much weight to any of the cold fusion rumblings that continued to be heard. Few made an effort to ask what those noises might mean. Just as many good scientists had "burned out" in chasing the elusive cold fusion Genie, so had many science journalists. They were sick of the ups and downs, the lack of a clear decision after so many months, and with good reason feared ridicule if they pursued the continuing strange scientific reports.

The power vacuum was filled with the opposition viewpoint of the hot fusioneers. By late 1990 the journalistic "consensus view" had solidified to: "There is probably nothing to cold fusion, but even if cold fusion is real, it probably won't be very useful." An example was the cautiously worded assessment that respected science writer William J. Broad of *The New York Times* included in his October 9, 1990, update on hot fusion: "The allure of 'cold' fusion was that it seemed to promise enormous energy from simple devices that worked at room temperature, in contrast to hot fusion machines, which must operate at temperatures above those on the Sun, and are vastly complicated and expensive. But after a year of intense investigation, most experts have dismissed the notion that cold fusion, if it exists, will ever be a significant energy source."

Astronomer and noted author Carl Sagan gave his perspective on cold fusion and its coverage in the press when he responded to a question posed at a gathering of science writers at Cornell University in November 1989.

"In the case of cold fusion," he said, "we have a contention that you do something with palladium and with some hydrogen isotopes—on a table top, at room temperature—and you can make fusion happen, or at least generate fusion products, or at least make some heat that otherwise can't be generated. That's the contention. And it may or may not have ultimate commercial applications, which is why everybody is interested in it, not because there might be some novel physical process.

"Now how do we decide that?" he continued. "Do we decide it by polling the membership of the American Physical Society? No! Polls don't work. They might not be knowledgeable or the minority might be right; it's happened many times in science. Do we write an article saying, 'Well, there is a disagreement, but the prevalent opinion is thus and so?' No. What we do is we say, 'The scientists don't know! They can't figure it out.' Some people say this thing, some people say that thing—too early to say! Let's wait a few years. I guarantee that five years from now, this will be a dead issue. It will either be, there is such a thing or there isn't such a thing. We will not

New Energy Times Archive

be sitting in some middle ground wondering. The stakes are too high. Either way, the definitive *disproof* of Fleischmann and Pons or the definitive *proof.* The rewards are so great that scientists—competitive, querulous lot—will decide one way or another."

(End of *Fire from Ice* quote of Sagan)

As we all know, the science journalists went right out and *did* "poll" the physicists to reach their negative conclusions about cold fusion—exactly what Sagan warned them *not to do!* Jerry Bishop, formerly of *The Wall Street Journal*, virtually alone among journalists, continued to write objective stories about cold fusion—and he was *brutally attacked* for doing so. He was at the meeting in 1989 when Sagan spoke. Now he has retired from the *Journal* and no one there continues his work.

Shortly before his death, Carl Sagan left us one more view of cold fusion — all the more tragic, because with the information he had had in his hands he should have been able to do much better. To be charitable, perhaps he was just too busy to study the evidence. Sagan, an enormously influential scientist, was apparently not strong enough to resist the appalling ignorance of and intolerance to cold fusion in the scientific community. Though he was still open-minded, for which he is to be praised, he really had ignored his own 1989 advice. His words are from *Billions and Billions: Thoughts on Life and Death at the Brink of the Millennium* (Random House, 1997, ISBN 0-679-41160-7) p.126:

"What I've talked about in the last paragraph is hot fusion—so called for a good reason: You have to bring materials up to temperatures of millions of degrees or more, as in the interior of the Sun, to make fusion go. There have also been claims for something called cold fusion, which was first announced in 1989. The apparatus sits on a desk; you put in some kinds of hydrogen, some palladium metal, run an electric current, and, it is claimed, out comes more energy than you put in, as well as neutrons and other signs of nuclear reactions. If only this were true, it might be the ideal solution to global warming. Many scientific groups all over the world have looked into cold fusion. If there's any merit to the claim, the rewards, of course, would be enormous. The overwhelming judgment of the community of physicists worldwide is that cold fusion is an illusion, a melange of measurement errors, absence of proper control experiments, and a confusion of chemical with nuclear reactions. But there are a few groups of scientists in various nations that are continuing to look into cold fusion—the Japanese Government, for example, has supported such research at a low level—and each such claim should be evaluated on a case-by-case basis.

Maybe some subtle, ingenious new technology—wholly unforeseen at this moment—is just around the corner that will provide tomorrow's energy. There have been surprises before, But it would be foolhardy to bet on it."

Astute readers of *Infinite Energy* know very well that the "surprise" is already here. You *can* bet on it and win!

The Silence of the Lambs — Science Journalists and Cold Fusion

A Review by Dr. Eugene F. Mallove of.....

A Field Guide for Science Writers —

"The Official Guide of the National Association of Science Writers"

***Edited by* Deborah Blum and Mary Knudson**

New York, Oxford, Oxford University Press 1997, ISBN: 0-19-510068-9

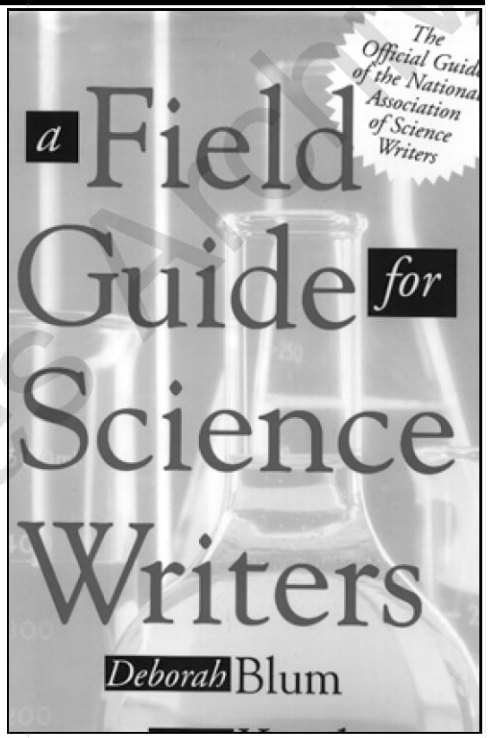
With little doubt, science journalists are among the most influential members of the journalistic corps, helping to translate for the general public complex and often astonishing developments on the frontiers of biology, medicine, technology, and physical science. Financial decision-makers from the private sector and government take their cues from what science journalists—in both print and broadcast media—tell them about science and technology.

Science journalists are thus very powerful figures, particularly those with large audiences such as *The New York Times*, *The Washington Post*, *The Wall Street Journal*, *Discover* magazine, the television networks, and especially the news and editorial pieces within the archival journals *Science* and *Nature* magazines. It is well known that these influential sources govern what virtually all science journalists in the United States and abroad write and think.

Unfortunately, science journalists are far less numerous than reporters covering politics, sports, entertainment, and virtually every other "beat." But when matters of great public concern arise, such as over climate change, energy and environmental policy, space exploration, medical advances, asteroid impacts, etc., science journalists may *literally* hold the fate of civilization in their computers. So it was and *is* with cold fusion. Massive tomes and doctoral theses are destined to be written about how certain science journalists did or did not cover the cold fusion controversy fairly and comprehensively.

The perceptions of the general public about the importance or irrelevance of issues in science often rest squarely on the shoulders of science journalists. To cite a prominent example: if the science journalists tell us that the "overwhelming majority" of scientists believe that the terrestrial environment is seriously endangered by one aspect of accelerating human activity, this soon becomes a dominant belief—laws are made, policy is set, actions are taken.

By the science journalists' failure in general to cover cold fusion conferences and developments, or by active disparagement of the science, the public is denied its right



to know what is happening in this field. My impression of science journalists at large is that they may think they are "doing the public a favor"—filtering out this allegedly "false hope" in what they were fooled to believe is "pathological science."

For years, we in the cold fusion community have been amazed at the appalling treatment given cold fusion by the science journalist community as a whole. There are exceptions, of course: Jerry Bishop, formerly of *The Wall Street Journal*, Dr. Michael Guillen of ABC Television, Ira Flatow of National Public Radio, in past times Otis Port of *Business Week*, Jerry Thompson (formerly with of the Canadian Broadcasting Corporation), and Ron Dagani of *Chemical & Engineering News,* These have been virtually the only conduits of objective information about the coming energy revolution. (*Infinite Energy* magazine and other cold fusion publications obviously have a smaller reach, at least for now—we are a growing threat to the status-quo, since the magazine is now received in 37 countries!) In the UK cold fusion has fared much better, but we'll leave that for our UK Contributing Editor Chris Tinsley to discuss in a later issue of

IE.

Now, this is no place of a doctoral thesis, just a brief review of a very interesting book that came our way, *A Field Guide for Science Writers*, edited by **Deborah Blum** and **Mary Knudson**, published in 1997 by Oxford University Press. The book's cover states that this is "The Official Guide of the National Association of Science Writers (NASW)—an organization to which I once belonged, before resigning in 1994 in a dispute over the obvious failings of that very influential organization on the matter of cold fusion.

For readers not familiar with my background beyond engineering, I am an astronautical and environmental engineer who in the mid-1980s began to devote more of his time to popularizing science and technology. I wrote a dozen lengthy pieces for the *Washington Post's* Sunday Outlook section, and several major features for MIT's *Technology Review*. After serving at the *Voice of America* in Washington, doing science writing and broadcasting on science and technology for the Current Affairs Division, I returned to my alma mater, MIT, where I was the Chief Science Writer at the MIT News Office (September 1987-JUne 1991). For several semesters, I taught science journalism at MIT and at Boston University. And, of course, I made my mark with *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* (John Wiley & Sons, 1991), a book which was widely disparaged, but mostly ignored by science journalists. Nonetheless, of the four major books on early cold fusion history, it was the *only* one that drew the correct conclusion about the science.

In May 1991, I went against the received wisdom of the science journalists. I wrote that the evidence for cold fusion had become "overwhelmingly compelling." It is impossible to say that now: cold fusion, whatever its spectacular energy-producing and nuclear reaction-promoting mechanism, is 100% proved, though there is *zero* chance that opposition scientists will take note of the massively published data. The scientific goal posts for acceptance have been moved repeatedly since 1989 and they are now off the map.

Obviously, this conclusion that cold fusion is real and revolutionary is not to the liking of the Science Establishment's stone-throwers. Following 1989, they are no longer *remotely* involved in doing experiments or assessing data in the cold fusion field, but they are the ones whom the science journalists still quote. These are not scientists, they are propagandists, very successful ones at that, who have conned the vast majority of science journalists into thinking cold fusion is bunk, delusion, and fraud.

This NASW book, "Field Guide.." only reinforces my strong impression of most science journalists as "out to lunch" and "up the creek without a paddle" on the matter of cold fusion. We could have hoped for some semblance of "balance," but such is not to be found. The book does not even mention favorably Jerry Bishop's award-winning cold fusion coverage—and he is a venerable member of NASW! Any prospective or neophyte journalist would get the distinct impression that cold fusion is cold out dead.

The book has some redeeming qualities in its overview of the general process and methods of science journalism, as told directly from by a variety of science journalists. Among memorable essays was one by **John Nobel Wilford** of the *New York Times,* discussing the pains and pleasures of writing books about science, a topic to which I could certainly relate. But the NASW book cannot be recommended to *anyone,* because it is fatally flawed and damaged goods on the matter of cold fusion. Owing to the serious implications of cold fusion for all of science and technology, this book is a disgrace and an intellectual hazard to its less-informed readers. The editors suggest that their book is "for anyone—writers, scientists, consumers—who would like to better understand how science writers decide what to write about and how to present it." That's a pretty powerful reach, and the NASW *does* have over 1,800 members—with members in 20 countries.

Owing to the serious implications of cold fusion for all of science and technology, this book is a disgrace and an intellectual hazard to its less-informed readers.

Just as dangerous cars and trucks are recalled, this book is a prime candidate for major fixing. It will be interesting to discover what the NASW and the book's editors will do, once these spectacular failings become clear to them. How the editors could have allowed such distorted commentary is testament to the strength of the prevailing delusions. Here are some of the book's comments on cold fusion:

Boyce Rensberger, an influential science writer at *The Washington Post*: "Similar notes of skepticism attended most of the cold fusion coverage, except for that in the *Wall Street Journal*, which to the astonishment of many science writers, climbed aboard the bandwagon. Although small bands of researchers continue to work on cold fusion, the vast majority of experiments long ago dismissed it as a tantalizing illusion."

So, Mr. Rensberger thinks that science is done by vote counting? This is contrary to Carl Sagan's recommendation (quoted in an adjacent article) for how science reporting on cold fusion should be done—*not* by polling. Just report *the facts*, what is going on— just as Jerry Bishop did so well in the *Wall Street Journal*. Rensberger did not cite Bishop by name; he should have, if he was going to be critical. Regarding cold fusion, Rensberger would be advised to adhere to his own cardinal rule: "Never try to explain something that you don't understand?"

The latter guideline could also be applied to the past coverage (and now total lack of coverage) of cold fusion by **William Broad** at the *New York Times*. Broad, a very influential journalist who generally writes excellent stories, is not even mentioned in this book. But on March 17, 1991 in the Sunday *New York Times*, he gave front-page coverage to the suggestion by Frank Close of the UK (and Close's soulmates at MIT) that Pons and Fleischmann were unethical scientists. Recently, William Broad received the astonishing peer-reviewed cold fusion work of *hot* fusion scientist Dr. Y. Arata in Japan (published in English in peer-reviewed Japanese journals—see *IE* #12). The Arata/Zhang work confirms reproducible excess energy generation at 200 to 500 million joules per mole of palladium *and* helium-4 / helium-3 production with highly anomalous isotope ratio. Broad said that he *might* write about it if the work were reproduced by someone else! I seriously doubt whether Bill Broad understands the significance of Arata's work, so it is not likely to see the light of day in the *New York Times*.

Though he did not address the cold fusion controversy directly—in fact, he ignored it completely even though EPRI and SRI International are in his own back yard— **David Perlman**, the science editor of the *San Francisco Chronicle*, writes appropriately, contradicting Rensberger, "They [science writers] are fair, but they must always recognize that merely counting yeahs and nayes in a scientific controversy fails to serve the public and is rarely a real guarantee of fairness." The following statement of Perlman could easily be applied to the MIT hot fusioneers—too bad Perlman has not taken the action he suggests: "And certainly solid investigative reporting is urgent when the deceits and grant maneuverings and corporate conniving of a few scientists foul the enterprise

New Energy Times Archive

and cheat the public."

Joel Greenberg, science and medicine editor at the *Los Angeles Times*, has a lot to say about cold fusion. HIs description, in part:

"It seemed like a textbook case of a story to avoid. The claim, particularly using such a technique seemed fantastic. The research paper had yet to be published in a refereed journal. And no one at Princeton or anywhere else fusion research had been pursued for many years had come close to such a result. Most science writers knew this was a sensational story that almost certainly would prove to be not true, at least not to the point of the university's claims...."

"Nevertheless.....to ignore it would have been a mistake."

".....May of that year when the American Physical Society met. Some 40 papers were presented evaluating the quality of the Utah research. The papers documented 'numerous errors.' In perhaps the death knell to the cold fusion experiment, Caltech physicist Steven E. Koonin concluded that Pons and Fleischmann's results were based on 'incompetence, and perhaps delusion.' Most knew it would end that way. But because it had become such a high-profile issue, the cold fusion story had to be reported full-bore, with all the resources the newspaper would have devoted to any other major story. And, most important, it had to be kept constantly in the proper perspective. To do anything less would have run the risk of either blowing the claims out of proportion or dismissing them without proper consideration. The key to such thorough science writing is to balance as many authoritative sources as possible."

It appears that Mr. Greenberg is very self-satisfied with the cold fusion coverage of the *Los Angeles Times*. The basic theme is that he and his colleagues "knew it would end" with a negative conclusion, but they nobly did their journalistic duty by reporting the story adequately and fairly.

Perhaps Mr. Greenberg would consider this: why not continue his paper's coverage and balance the authoritative sources of the peer-reviewed positive cold fusion results of the past eight years, which are so numerous, with the handful of peer-reviewed negative results and *newspaper pronouncements* of Drs. Koonin et al—"balance as many authoritative sources as possible"? Is Greenberg up to that? I think not.

We learn from **David F. Salisbury**, a university science writer at Stanford University: "On the other hand, I have no desire to promote flawed science. Unfortunately, there will always be cases where it is extremely difficult for university writers, like reporters, to tell the difference. All but the most fortunate university science writers sooner or later face pressure from administrators to publicize certain projects or put some questionable spin on certain stories. The most egregious cases are when the administration encourages scientists to 'publish in the press' before the research has been peer-reviewed. The most notorious case of this sort in recent years was the cold fusion controversy ignited by the University of Utah." I wonder if Mr. Salisbury is aware of how much "publishing in the press" gets done by major Big Science programs, such as by hot fusion labs announcing non-peer reviewed, non-published results—conveniently just before major federal budget decisions?

What about "Sources of Information" recommended by the Editors, **Ms. Blum** and **Ms. Knudson**. They are enthusiastic about one of the most bigoted physics and policy sources: "A good weekly summary of science-policy news of interest to physicists is *What's New*, by Robert Park of the American Physical Society. It can be obtained electronically. To subscribe, send an e-mail message to listserve@aip.org. In the body of the message, type 'sub whatsnew.'" Park routinely mocks cold fusion developments as well as *all* other establishment-attacked scientific anomalies.

Earlier in the NASW book, **Kim McDonald** of the *Chronicle of Higher Education* quotes Park, apparently his physics mentor; "A Ph.D. in physics is not an inoculation against insanity." Park used that one-liner against cold fusion and a host of other scientific mysteries. McDonald quotes further, "You need to develop a set of contacts of scientists whose judgement you trust." McDonald's message is: Trust Robert Park and the APS.

Under "Technology" resources, for some unfathomable reason, Blum and Knudson list only four books. One of them is by Gary Taubes, *Nobel Dreams: Power, Deceit, and the Ultimate Experiment*, Random House, 1986. Perhaps we should be thankful that the Editors did not include Taubes' 1993 anti-cold fusion diatribe *Bad Science.* But why *Nobel Dreams*, about physics research, under "Technology," and why Taubes? Do they think that Taubes sets some kind of standard for science writing? It is well known that Taubes came close to being sued by his victims for *Nobel Dreams.* He may have come even closer for *Bad Science*.

On one level we in cold fusion media, research, and technology may be angered by the pack-mentality creatures quoted in the NASW "Official Guide," but on another level we should pity the poor science journalists. At least 99 percent of them have missed the greatest science story of the century, maybe of the millennium. Cold fusion, rising phoenix-like from the fires to which it was consigned by the de-facto Science Establishment and science journalist alliance that began in 1989-90 is making a mockery of the journalists' sheep-like behavior.

What happened is very simple to understand, but inexcusable. All too soon, most science journalists bought onto the lies and propaganda of the hot fusioneers, vested intellectual interests in academe, and the scurrilous writing of Taubes, Close, and Huizenga. For all their pontificating about getting the story correctly and checking facts, and balance, when all is said and done, science journalists are creatures who follow fashion and favor. They bow to the god Peer Review, even though they apparently know nothing of how prone to wanton exclusion that process can be. Science journalists need a strong dose of science history!

We have Blum and Knudson editorializing: "There's probably no area of reporting that has a higher standard for doing your homework than science writing, or more of an imperative to get it right....Science writers may indeed be held to a higher standard of accuracy and understanding."

These science journalists—the ones quoted here and so many more— are now facing nothing less then the triumphant rebirth of ancient alchemy—in the form of electrochemical cells doing fusion, fission, and God-knows-what-else. And many of these poor souls have been sleep-walking through it all! (Hey guys, there's still time left for *some* of you—wake up!) It will be very interesting, indeed, to see how the science journalists handle their cold fusion comeuppance. We've got lots of crow recipes cooking! But we would much rather serve them cold fusion story ideas and concrete information. It is for them to decide for themselves whether to revise their positions. The world would be a far better place if they did.

If you are a science journalist, *before* you write about cold fusion—*do your homework and GET THE FACTS!* Subscribe to *Infinite Energy* Magazine
P.O. Box 2816
Concord, NH 03302-2816

New Energy Times Archive

Yes, We Have No Neutrons:

An Eye-Opening Tour through the Twists and Turns of Bad Science

by A. K. Dewdney

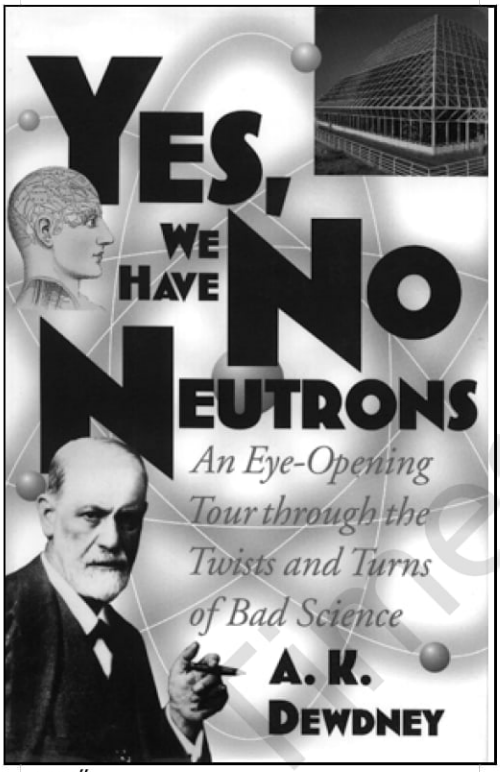
John Wiley and Sons, Inc. 1997, ISBN: 0-471-10806-5

Reviewd by Eugene F. Mallove

The first thing I noticed about this book was that its title had an eery familiarity. Sure enough, it was cribbed from my very own *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* (1991), the title of Chapter 8! The book's publisher was familiar too—John Wiley & Sons. With the subtitle, "An Eye-Opening Tour Through the Twists and Turns of Bad Science," the book *had* to be yet another assault on cold fusion, among other purportedly bogus scientific episodes.

In that sense, the book did not disappoint. Further cribbing: Author Dewdney stole the "Bad Science" theme of Gary Taubes' anti-cold fusion book, Bad Science: The Short Life and Weird Times of Cold Fusion (Random House, 1993). This sad little book —very little, indeed, only 163 pages of body—is an example of yet another incompetent bumbler spewing forth his prejudices about various episodes in science he deems examples of "bad science." There are points in this bumbling dissection of various happenings with which one might agree, but after examining the astonishingly inept treatment of cold fusion—inept even for a cold fusion critic—one would be forced to take *everything* else in this book with a large tablespoon of salt.

I'll not spend much time on the other science decried by Dewdney, let's just see how he handles cold fusion. First, he looses on step one: basic knowledge and copy-editing: He and his handlers at Wiley manage to misspell Martin Fleischmann's name throughout the book and even in the very first sentence of the introduction! He has it as Fleishmann. The book's introduction, "Of Sorcerers and Apprentices," introduces the strange concept of the scientific "apprentice," or the "bumbler," as Dewdney phrases it. Dewdney, by the way, was formerly the author of the "Mathematical Recreations" column in *Scientific American*, and he is Associate professor of Mathematics at the University of Western Ontario. We learn that in his opinion F&P are *not* frauds, just "bumblers" — "apprentices." The true scientists — the "good scientists" — are the masters, the "sorcerers." Of course, the Library of Science promotional piece for the book calls it "An entertaining look at the frauds and fallacies committed in the name of science."



He describes the cold fusion episode straight out: "For a few nights and days we lived in an atmosphere of dreamy unreality. Imagine! Free energy! It was magic...But magic can go awry, as the sorcerers apprentice discovered. Failure to follow the exacting methodology of good science can produce strange results, as Pons and Fleis(c)hmann also discovered."

Dewdney makes the astounding claim that Pons and Fleischmann were so eager to announce their discovery that they were "ignoring the fact that their results were essentially irreproducible." This is totally at odds with historical fact; it is a oft-repeated lie that filled the void of Dewdney's laughable ignorance of practically every aspect of cold fusion. One thing is certain, Dewdney is a mere "apprentice" to such anti-cold fusion Masters of Deception as John Huizenga and Gary Taubes. So why this book? Did not the feeble-minded editor in charge not think to check the facts with at least the previous Wiley Book, *Fire from Ice*? Apparently not, witness the misspelling of Fleischmann's name throughout. We have learned second hand that it was Wiley that chose the title of this book, so it had to have come via a Wiley editor stealing from *Fire from Ice*..

More from Dewdney about "apprentices" in science: "What is the apprentice then, but someone whose dreams of glory (or wealth) obscure or displace true caring?...If there are dreams of glory, real scientists keep them trembling in the background." So Fleischmann and Pons were "uncaring" about the validity of their work? And is "trembling in the background" how one would describe the incessant press agitation of the hot fusioneers about the performance of their vaunted machines?

In the introduction, Dewdney proves that he knows not of what he speaks: "I describe how these two sorcerers-turned-apprentices could not repeat their own experiments with any degree of reliability: Sometimes they got anomalous currents from their electrolytic cells and sometimes they didn't." Currents!! He thinks Pons and Fleischmann were claiming electricity production?! Later, contradicting this description, he says, "Fleischmann and Pons reported their electrolytic cells produced more heat than they consumed." *Consuming* heat or *producing* electricity? How could such preposterous errors creep into a discussion of cold fusion!

Dewdney, incompetently cribbing from another anti-cold fusion book (Frank Close's *Too Hot to Handle*), says that physicist Stan Lockhardt (the incorrectly spelled name of Luckhardt) was *leading* a team at the MIT Plasma Fusion Center investigating cold fusion. No, Lockhardt (Luckhardt) was not leading any team -- it was Professors Parker and Wrighton who led the team.

Dewdney says that on August 7, 1990, when "the University of Utah sponsored the first annual meeting of the National Cold Fusion Institute, it must have seemed strange to the two electrochemists to be surrounded by two-hundred 'believers.' as they were then coming to be called." First, the first annual meeting was in March/April, 1990, not August. Second, it is incredible to realize that Dewdney actually believes his own propaganda. He thinks that Pons and Fleischmann knew that they were "fooling" everyone and were surprised to see so many "believers."

This is 1997, mind you, and Dewdney can still write stale absurdities the likes of: "From this point on [August 1990!], however, the number of believers began to dwindle steadily. The dream was dying,

New Energy Times Archive

and somewhere (but not in a jar) the fusion genie laughed a hollow laugh." He repeats the nonsense propagated in the *New York Times* article by William Broad, "On October 23 no one could find Pons, and his house had been put up for sale."

Dewdney can't even get John Huizenga's name or affiliation straight! He calls him John Huizinga and says that he is a physicist at MIT, not the University of Rochester, Huizenga's correct affiliation then.

Dewdney writes admiringly of Frank Close's conclusion that "errors" in the Pons and Fleischmann calorimetry may have been due to their using open cells. Then he states, "It is true, nevertheless, that many subsequent attempts to detect the anomalous heat with closed calorimeters have failed." Oh? The SRI International calorimetry, on which the EPRI conclusion supporting Pons and Fleischmann was based, was all closed cell. Does Dewdney think he can just make up facts and history? Apparently. He has a lot of company —the phenomenon is quite common among virulent cold fusion "skeptics."

The book is filled with Dewdney's childish, cheap humor, e.g. "in search of a new idea, a scientist may plunge into a hot bath, ponder the universe in an opium den, visit a psychiatrist, lie on the floor kicking and screaming, whatever works." or "I ask Euclid in flawless classical Greek (writing books gives you strange powers) to rephrase his proof in English." Maybe that's how Dewdney writes his books?

One last buffoonish statement "graces" Dewdney's indigestible tract: "At last report, Fleis(c)hmann and Pons were happily running new versions of their experiment and building a commercial scale experimental cold fusion reactor. Whatever we may think of the science, how can we not wish them luck."

Thanks, but no thanks, Dewdney! There are no reports of Japanese official or corporate activity in cold fusion. There are no reports of other international conferences or publications. So, we can only conclude that Dewdney makes up stories and is living in a fantasy world. What must this say about his treatment of other matters in the book. To enumerate chapter coverage (not that any serious reader of *IE* would waste their time on this book): 1. The Century Begins: The Rays that Never Were; 2. Mind Numbers: The Curious Theory of the Intelligence Quotient; 3. Dreaming up Theories: The Unconscious Con of Sigmund Freud; 4. Surfing the Cosmos: The Search for Extraterrestrial Intelligence [Dewdney says that SETI has consumed over a billion dollars in congressional appropriations —a complete falsehood. He also says that SETI is unavoidably geocentric and "essentially nonfalsifiable" science, which is a thoroughly misinformed opinion.]; 5. The Apprentice Builds a Brain: Misled by Metaphors [neural networks]; 6. Genie in a Jar: The "Discovery" of Cold Fusion; 7. Biosphere 2 Springs a Leak; 8. For Whom the Bell Curves: The Racial Theories of J. Phillipe Rushton.

This book is so bizarre, it is difficult to imagine the process that gave it birth. John Wiley& Son's, perhaps in a bow toward commercial self-interest (although they no longer carry or reprint it), has listed *Fire from Ice* first in the three references for the cold fusion chapter, but dubs the book, "The best exploration from the believer's side." Always the pejorative "believers." Spelling again: "Furor" is entered as "Furore."

Dewdney was recently quoted by science writer Lee Siegel in *The Salt Lake Tribune* (June 19, 1997). Dewdney is ever the joker:

"Despite his book, Dewdney said he has nothing against cold fusion or UFO's from outer space— if they ever prove real. 'Other things being equal, I'm all in favor of limitless energy and an alien in every garage.'"

Of his spelling Fleischmann's name incorrectly throughout, Dewdney told Siegel: "Just say Dewdney cringed."

By far the best description of the Dewdney approach is his own, on page 12: "Speculation flourishes in an environment that is free from the chilling effect of actual experiments." One might add, Dewdney's speculation flourishes "free from the chilling effect of actually reading the literature."

Another Book *Painfully* in Error About Cold Fusion

Why People Believe Weird Things: Pseudoscience, Superstition, and Other Confusions of Our Time,
Michael Shermer, W.H. Freeman and Company, New York, 1997,306 pages, $22.95, ISBN 0-7167-3090-1

p. 49—"**6. Bold Statements Do Not Make Claims True**

"Something is probably pseudoscientific if enormous claims are made for its power and veracity but supportive evidence is scarce as hen's teeth. L. Ron Hubbard, for example, opens his *Dianetics: The Modern Science of Mental Health*, with this statement: "The creation of Dianetics is a milestone for man comparable to his discovery of fire and superior to his invention of the wheel and arch" (in Gardner 1952, p. 263). Sexual energy guru Wilhelm Reich called his theory of Orgonomy "a revolution in biology and psychology comparable to the Copernican Revolution" (in Gardner 1952, p. 259). I have a thick file of papers and letters from obscure authors filled with such outlandish claims (I call it the "Theories of Everything" file). Scientists sometimes make this mistake, too, as we saw at 1:00 P.M., on March 23, 1989, when Stanley Pons and Martin Fleischmann held a press conference to announce to the world that they had made cold nuclear fusion work. Gary Taubes's excellent book about the cold fusion debacle, appropriately named *Bad Science* (1993), thoroughly examines the implications of this incident. Maybe fifty years of physics will be proved Wrong by one experiment, but don't throw out your furnace until that experiment has been replicated. The moral is that the more extraordinary the claim the more extraordinarily well-tested the evidence must be."

p.7. **"Had the cold fusion findings, to take a recent spectacular example of a false positive, not been made so public before corroboration from other scientists, they would have been nothing out of the ordinary."**

Author Michael Shermer is the Publisher of *Skeptic* magazine, the director of the Skeptics Society, and the host of the Skeptics Lecture series at Caltech. He teaches the history of science, technology, and evolutionary thought in the Cultural Studies Program at Occidental College in Los Angeles.

***Your* ad could be in this space.**
Call or write to Cold Fusion Technology, Inc. for ad rate information....NOW!

Infinite Energy

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816

Phone: 603-228-4516
Fax: 603-224-5975

76570.2270@compuserve.com

The amazing discovery of ***Cold Fog Explosions.....***

Extracting Intermolecular Bond Energy From Water

Peter Graneau, Ph.D.

Center for Electromagnetics Research, Northeastern University, Boston, MA 02115, U S.A.

From the *PROCEEDINGS OF THE FOURTH INTERNATIONAL SYMPOSIUM ON NEW ENERGY,* May 1997

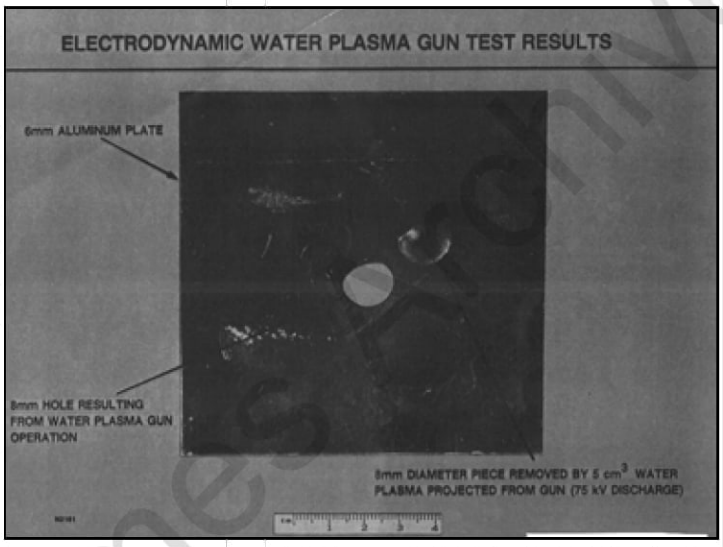
Abstract

When a small amount of energy from a high voltage capacitor is discharged through a few cubic-centimeters of water, a strong explosion results which cannot be explained with thermodynamic nor electrodynamic forces. The 90-year history of unusual water arc explosions and their technological applications is reviewed. Three years ago it was discovered that what explodes is not the liquid water plasma but a quantity of dense cold fog generated in the plasma. The paper examines the science of this phenomenon.

It is concluded that tiny fog droplets contain less intermolecular bond energy, per unit mass, than bulk water. The energy difference is liberated quantum mechanically when the fog is created and sets up strong repulsion forces between the fog droplets. The extracted bond energy, which appears as kinetic energy of the fog, was deposited in the water during condensation in the clouds. It is argued that the heat of condensation is transformed to bond energy so that the explosions are actually fueled by concentrated solar energy which heated the vapor in the atmosphere. The extraction of internal water energy does not contribute to environmental pollution nor to global warming.

History of Water Arc Explosions

The energy we are liberating from ordinary room temperature water is set free by an electric arc in the water which causes an explosion. It is now known that what explodes is not liquid water but cold fog. There is a ninety year history of experiments with water arc explosions. It began in 1907 when Trowbridge [1], at Harvard University, passed a long electric arc through water-laden air. This produced a cloud of white fog. Trowbridge discovered another effect which has a bearing on fog explosions. He stretched a sheet of paper alongside his sparks of more than 50 cm length and found that at every corner and forking of the lightning-like discharge, holes were punched through the paper without any burning or charring. It took eighty years until experiments of this kind were repeated in the Massachusetts Institute of Technology and revealed that thunder was not the result of heat and the thermal expansion of the lightning channel [2], as assumed during most of the twentieth century, but that the shock wave in air was driven by non-thermal forces of which electrodynamic forces were then considered to be the most likely. In view of our most recent findings, there exists the possibility that cold fog explosions also contribute to thunder.



During the Second World War, Frungel in Germany measured the unusual strength of water arc explosions and published his results in 1948 [3]. He concluded that the explosions were not caused by heat and steam and admitted freely that he was unable to explain the phenomenon.

Soon after Frungel's publication, water arc explosions found applications in electrohydraulic metal forming [4] and underwater pulse echo-sounding [5]. In 1969 the US Bureau of Mines issued a long report on their investigation of using water arc explosions for rock fragmentation [6]. In one experiment the investigators at the Twin City Mining Research Center noticed that the energy output was apparently 156 percent of the input. This result was dismissed as an experimental error. Not until the mid-1980s was the scientific basis of the puzzling explosions more extensively researched at MIT [7]. It was then shown that the discharge of 3.6 kJ of stored capacitor energy would create pressures in excess of 20,000 atm in 7 ml of saltwater. 3.6 g of water was ejected from the accelerator barrel at a velocity of the order of 1000 m/s and then punched a half-inch hole through a 1/4-inch thick aluminum plate [8].

At the time it was thought that the water was flying through the air as a coherent liquid slug. No evidence of boiling and steam formation could be detected and all the water found after the explosion was cool. Accepting the general view that plasmas are quasineutral and do not explode as a result of Coulomb forces, the available evidence seemed to leave little doubt that the explosions had been driven by electrodynamic forces. This observation did motivate a ten-year investigation of the electrodynamics of water arcs. The Lorentz force could not account for more than a small fraction of the measured force. Ampere's force law [9] fared better but still fell short of measured values by at least a factor of ten. The search for a new electrodynamic force was finally abandoned in 1994.

Another report of electrically induced explosions in water came from Kansas State University. Johnson [10] claimed that the loudness was distinctly greater than that obtained with an equivalent amount of gunpowder. He found that the remaining water was cool to the touch and apparently no steam had been produced. Johnson suggested the explosions may have been due to longitudinal Ampere forces and were tapping a new source of energy.

In 1994 the first video and high speed photographs were taken in three laboratories in the US, Canada, and England. They showed that the leading component of the water leaving the accelerator was actually very dense fog traveling at high speed and eventually rolling in air under the laboratory ceiling. By trapping the fog in a balsa wood absorber and measuring its temperature it was found to be quite cold, at most a few degrees above ambient temperature. The discovery of cold fog explosions changed the scientific outlook on the remarkable behavior of water arcs.

Discovery of Cold Fog Explosions

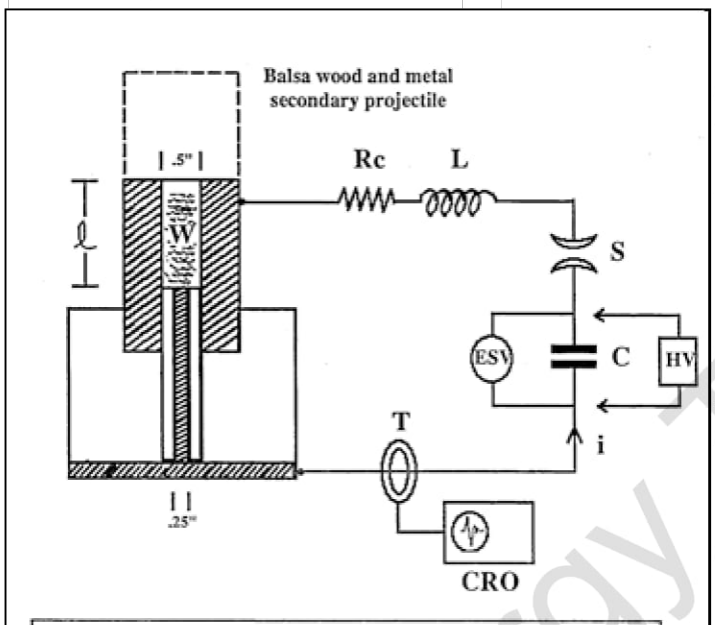
Our experiments and research on water arcs and cold fog explosions has been reviewed [9], up to October 1995, in our

New Energy Times Archive

book *Newtonian Electrodynamics* (See review in *IE#11—EFM*) This review enables interested scientists and engineers to repeat our experiments and build on them. The present paper is confined to the scientific basis of the process of extracting H_2O-H_2O bond energy from water.

The book reveals that a typical low-energy experiment involved a 0.5 μF capacitor charged to 12kV and, therefore, containing 36 J of stored energy. This energy was discharged through water volumes ranging from 1 - 5 ml. To appreciate just how little energy was fed into an explosion event it helps to know that striking a match liberates between 100 and 200 J of heat.

The arc explosions expelled most of the water—but not all—from the accelerator barrel in the form of a vertical jet which pierced the laboratory atmosphere. The kinetic energy of the ejected water was measured with a balsa wood secondary projectile standing on the accelerator muzzle and absorbing the high-speed component of the water. The momentum acquired by the secondary projectile determined the fog kinetic energy.



Type A accelerator with discharge cicuit.

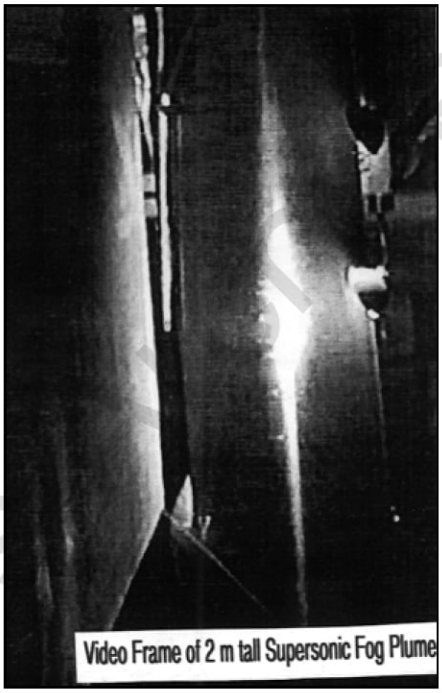
Two arcs were in fact involved. A switching arc had to be struck in order to apply the capacitor voltage across the water cavity. The ionization of the switch and water arcs consumed more than half the input energy. This energy loss is easily measured by observing the almost instantaneous volt-drop on the capacitor terminals. The ionization energy is stored as electrostatic energy in the arc plasma. When the ions recombine, long after the explosion, the stored plasma energy is converted to heat. Ionization accounts for the major energy loss of each experiment.

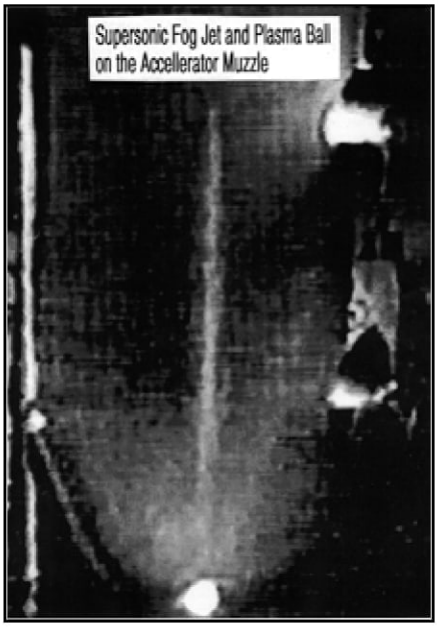
Another loss component is the Joule heat generated in the arcs, the capacitor, and the conductor connections. Its magnitude can be determined by observing the damping of discharge current oscillations. So it was found that more than 90 percent of the input energy was lost and converted to low-grade heat, a few degrees above ambient, which could not contribute to the explosion. The small remainder of the input energy was sufficient to supply the surface tension energy required for the transformation of bulk water to very small droplets. Electrodynamic Ampere forces in the arc, although far too feeble to explain the explosion, were nevertheless capable of tearing the liquid apart into small drops. In general no more than three joules of electrodynamic energy were capable of generating 10 - 60 J of kinetic energy in the escaping water jet. The difference had to be made up by internal energy stored in liquid water.

Not until 1944 were video and high-speed photographic cameras turned on water arc explosions to determine what was driving them. Since the ejected water was so powerful that it could penetrate metal plates, it was taken for granted that the water traveled as a liquid slug in order to concentrate the impact inertia force. Much to our surprise it was discovered that a jet of high-speed fog shot out of the accelerator which was followed by slow water of little kinetic energy.

Tip velocities as high as 600 m/s (Mach 2) were observed which pierced the atmosphere by a conical shock wave. At lower input energies the tip velocity was subsonic and formed a mushroom head. In the Workshop **[Ed.Note: This is Graneau's workshop at the 4th International Symposium on New Energy, a video tape of this lecture is available from Cold Fusion Technology, Inc.—*EFM*]** I will show a video film, shot by the British Broadcasting Corporation (BBC-TV) in the TCBOR laboratory of Richard Hull [11] in Richmond, VA. Hull has been collaborating with the author and George Hathaway of Hathaway Consulting Services in Toronto, and also with Neal Graneau in the Department of Engineering Science of Oxford University.

The video film documents the whole process of the water arc explosion and clearly shows the fast fog jets. The fog ultimately collects under the laboratory ceiling


Video Frame of 2 m tall Supersonic Fog Plume


Supersonic Fog Jet and Plasma Ball on the Accellerator Muzzle

as a cloud which rolls around while it evaporates in a matter of seconds. To dramatize the events, the BBC asked for a1/4-inch thick plywood sheet to be placed on the accelerator muzzle and an increased input energy of 324 J. The fog jet punched a 1/2-inch hole through the plate. The conical tip of the fog jet above the plate indicated that it was still traveling at supersonic speed.

Ball lightning enthusiasts will see a plasma ball sitting on the accelerator muzzle for at least 100 ms, long after the fast fog had left the barrel. This is of no practical

New Energy Times Archive

importance as far as the cold fog explosions are concerned. The plasma ball probably contained a fraction of the ionization energy.

High speed photography at 10,000 frames per second carried out at Oxford [9] showed in detail how the fog jet struggled with the laboratory air and quickly lost speed and kinetic energy due to atmospheric ablation. A long tail of slow water leaving the barrel consisted of large drops and films which were transparent. They suggest that the fog had to penetrate at least part of the liquid water in the accelerator and imparted velocity to it by drag forces.

Fog formation seems to be an essential phase of the water arc explosion. No fog-free explosions have been noted. It seems quite certain that what takes place is an explosion in which the tiny fog droplets repel and accelerate each other inside the arc cavity. As soon as the fog leaves the accelerator the droplets stop to repel each other, as proved by the absence of lateral expansion of the fog column just outside the accelerator. Higher up in the atmosphere the fog jet spreads laterally on account of air ablation and not droplet repulsion. The absence of this repulsion outside the accelerator, when much of the fog must still be ionized, appears to rule out repulsion by Coulomb forces.

There is much to be learned about the fog dynamics in the water arc. At the present stage of the research we have credible evidence that the fog droplet repulsion disappears and the fog explosion is over before the current ceases to flow. This is not to say that the current is responsible for droplet repulsion. A more likely explanation is that the electrodynamic forces, which are proportional to the square of the current, cause fog formation and this process fades out with the current.

H_2O-H_2O Bond Energy in Fog Droplets

There is reason to believe that the intermolecular bond energy in tiny fog droplets, of 1 - 100 μm diameter, is smaller per gram than what it is in bulk water. If this is correct, then the bond energy difference has to be liberated when water is converted to fog. Quantum mechanics is the theory of particle bonding. Bond energy appears and disappears instantly when bonds are made or broken. When the conversion from liquid water to a lot of fog occurs very quickly, that is in microseconds, the only way in which the quantum mechanical bond energy difference can be dissipated is by an explosion or strong particle repulsion. The conversion of bond energy to heat is too slow to achieve the same end, because it involves the time-consuming process of particle acceleration.

Bond energy is potential energy which particles possess by virtue of their mutual forces of attraction and repulsion. Repulsion is said to be associated with positive potential energy and attraction with negative potential energy. There is no doubt that liquid water molecules attract each other. This is the essence of liquid cohesion and it must involve a certain amount of negative potential energy.

The two hydrogen atoms of the water molecule are not attached symmetrically about the larger oxygen atom. This lack of symmetry makes the water molecule an electrostatic dipole. The strength of the attraction between two electric dipoles depends on their distance of separation and their mutual angular orientation. The H_2O molecules in the liquid are in continuous motion and rotation relative to each other. Because of this chaos it should be impossible to make any prediction about the bond energy of liquid cohesion.

There are, however, grounds to argue that the dipole orientation in water is not entirely random because water has a definite dielectric constant which requires a certain degree of dipole alignment. The study of water structure is a very active but complex field. The consensus of opinion seems to be that locally the dipole structure changes perpetually, but globally there exists a certain average order which can be equated to a definite amount of bond energy per unit mass. This is numerically equal to the latent heat of evaporation which amounts to 540 cal or 2260 J per gram. The latent heat is in fact the energy required to break all intermolecular bonds.

When considering droplets of varying diameter it would not be surprising to find that the bond energy per unit mass varies with droplet size. This is expected from the fact that the droplet surface must have some effect on dipole structure because of the forces which bring about surface tension. Surface energy and tension are aspects of liquid cohesion.

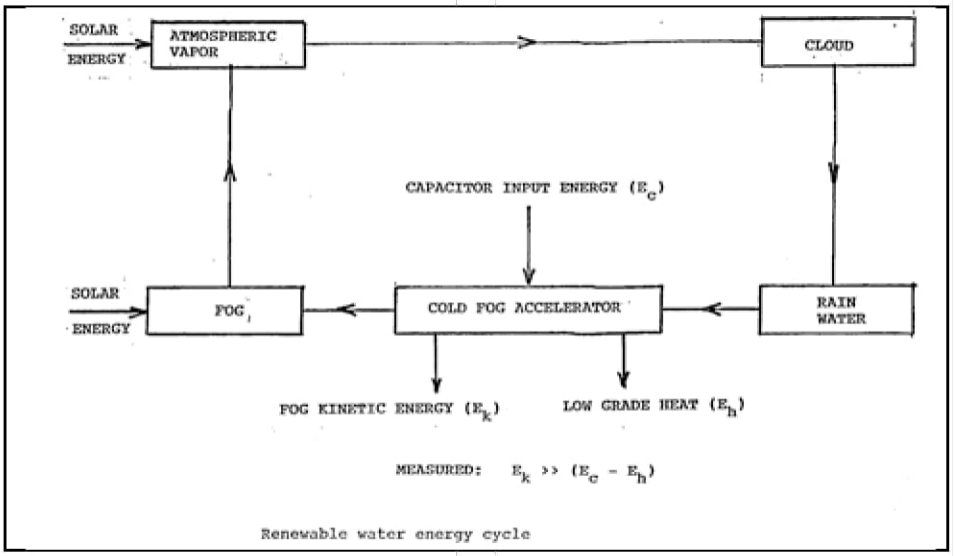
Water scientists argue that the vapor pressure above the droplet surface increases as the droplet diameter decreases. A high vapor pressure implies that it is easy for a water molecule to escape from the liquid. It is another way of saying the bond energy per unit mass decreases with decreasing droplet diameter. This argues in favor of the starting hypothesis of the bond energy in fog being smaller than in bulk water. It provides an explanation for the cold fog explosions.

The Water Energy Cycle

The fog ejected by the water arc into the laboratory air later takes up its latent heat of evaporation from the environment. Thereby it is converted to vapor and drifts away. On its wanderings through the atmosphere, the vapor somewhere meets the correct conditions for condensation into raindrops which fall to the ground and collect in pools. The rain water can again be fed into an arc accelerator and there be converted to fog. This completes the water cycle.

The accelerator extracts internal energy from the water. The only place where this energy can be restored to the water molecules is in the air. Almost all heat energy of the atmosphere derives from solar heating. In this way the water arc accelerator actually utilizes solar energy in concentrated form. The problematical aspect of this energy cycle is how the kinetic energy, or heat, of the water vapor ends up as bond energy in the raindrops. This clearly involves a phase change from vapor to liquid and the transfer of what is called the 'heat of condensation.'

It is a remarkable coincidence that the heat of condensation is equal to the latent heat of evaporation, which itself is equal to



Renewable water energy cycle

www.Energy Times Archive

the intermolecular bond energy. From this it would seem logical to conclude that the heat of condensation is directly converted to bond energy. After all, the bond energy springs into existence at the instant of condensation. If we believe in energy conservation, it must be possible to locate the bond energy before condensation and it is only natural that it should have been stored in the vapor.

This was the reasoning I put forward in two previous conference papers [12, 13]. Subsequently I was told that the teaching of physical chemistry claims that the condensation of water is an exothermic process. The heat of condensation must then become sensible heat which raises the temperature of the condensate and the environment. It would, therefore, not be available for the creation of bond energy. In addition, thermodynamics tells us that the heat flow away from the seat of condensation is such that it cannot be captured in a calorimeter. Therefore it is impossible to demonstrate by experiment that condensation is an exothermic event. This is the first surprise of physical chemistry as taught at the end of the twentieth century.

The second surprise is the lack of any indication of the origin of the H_2O-H_2O bond energy. There is no doubt of its existence as potential energy and the fact that energy must be expended to break the bonds. Energy conservation is not denied. At the same time the physical chemistry textbooks have no answer to the question: where was the bond energy before condensation? Not only is the answer missing, the question is never discussed.

Faced with these two surprises, my suggestion remains that the heat of condensation of water vapor is transformed into H_2O-H_2O bond energy right at the moment of condensation. If this is untrue, then we have no explanation of how internal water energy can be liberated by cold fog explosions.

A consequence of this reasoning is that the energy set free in fog explosions is actually renewable solar energy which involves no pollution of the environment. Furthermore, since the energy is first subtracted from the heat of the atmosphere before it is used technologically and converted back to heat, the whole water energy cycle does not contribute to global warming or the greenhouse effect.

References

1. J. Trowbridge, "High electromotive force: its application to the study of powerful electrical discharges and to spectrum analysis", Memoirs of the American Academy of Arts and Sciences, Vol.13, No.5 (1907).

2. P. Graneau, "The cause of thunder", Journal of Physics D: Applied Physics, Vol.22, p.1083 (1998).

3. F. Frungel, "Zum mechanischen Wirkungsgrad von Flussigkeitsfunken", Optik, Vol.3, p.125 (1948).

4. I. Gilchrist, B. Crossland, "The forming of sheet metal using underwater electrical discharges", IKE Conference Publication No.38, p.92 (Dec. 1967).

5. F. Frungel, High speed pulse technology, Vol.2, Academic Press, New York, 1965.

6. H.K. Kutter, "The electrohydraulic effect: Potential applications in rock fragmentation", Bureau of Mines Report 7317 (Dec. 1969).

7. R. Azevedo, P. Graneau, C. Millet, N. Graneau, "Powerful water-plasma explosions", Physi cs Letters A, Vol.117, p.101 (1986).

8. P. Graneau, P. T. Pappas, L.J. Ruscak, D.W . Swallom , "Electrodynamic water arc gun", 4th Symposium on Electromagnetic Launch Technology, University of Texas at Austin (April 1988).

9. P. Graneau, N. Graneau, Newtonian electrodynamics, World Scientific, New Jersey, 1996.

10. G.L. Johnson, "Electrically induced explosions in water", 27th Intersociety Energy Conversion Engineering Conference Proceedings, San Diego, CA, p.335 (Aug. 1992).

11. Richard Hull, "Water arc explosions", Electric Spacecraft Journal, Issue 14 (1995).

12. P. Graneau, "Gaining solar energy from ordinary water", Proceedings of the World Renewable Energy Congress IV, Denver, CO, (June 1996).

13. G. Hathaway, P. Graneau, "Possibility of liberating solar energy via water arc explosions", Proceedings of the 31st Intersociety Energy Conversion Engineering Conference, Washington, DC, (Aug. 1996)

The Nucleo-Electric Effect

by David Moon and Chuck Bennett

Disclosed herein is a proposed device to harvest electricity directly from a cold fusion type cell. Semiconductors of the N and P type are utilized in the construction of the main elements of the device. A thin metallic layer (of palladium, nickel, or titanium) is added to the N-type rod. The apparatus is sealed in a container that supplies H or D gas or an electrolyte with H or D.

The interface between the thin layer of metal and the surface of the N-type semiconductor is expected to be the focus of action to generate excess electrical voltage potential. The metal-Si (doped) interface is anticipated to satisfy the description of the theory originated by G. H. Miley and H. Hora, et al. [1,2] of the "swimming electron layer" (SEL) existing at the interface of semiconductors and metals having very different Fermi energy levels.

The expected result of the fusions in the metal-Si layer is the excitation of the valence electrons in the N-type semiconductor, thereby promoting these valence electrons from the valence band into the conduction band. Thus a direct conversion of a cold fusion reaction to electricity is accomplished and the term "nucleo-electric" effect is coined to describe the process.

A massive flux of excess electrons creates an electro-potential voltage to drive a complete circuit and power a load. The accompanying figure shows the cell details including an initial ignition energizer circuit. Once the nucleo-electric effect has started, the ignition energizer can be completely turned off and the cell will operate entirely on its own power. A cold fusion type fuel cell emerges and is supplied by the fuel of H or D in gaseous form or from an electrolyte containing H or D. Although the device functions as a cold fusion "engine," once started, the label of "nucleo-electric battery" may be more applicable.

The invention disclosed herein is in line with our efforts to find ways to produce actual devices that will "speed to market" the development of cold fusion energy for practical use.[3] We believe that this should be the utmost concern of cold fusion activists and researchers. In a side note, we would like to mention a peculiar discovery relating to the history of cold fusion. In reference[2], Hora demonstrates a dedication to revealing the secrets of transmutation within metal lattices. Hora, et al.[4] produced a patent in 1969 that seems to anticipate nuclear reactions within metal lattices.

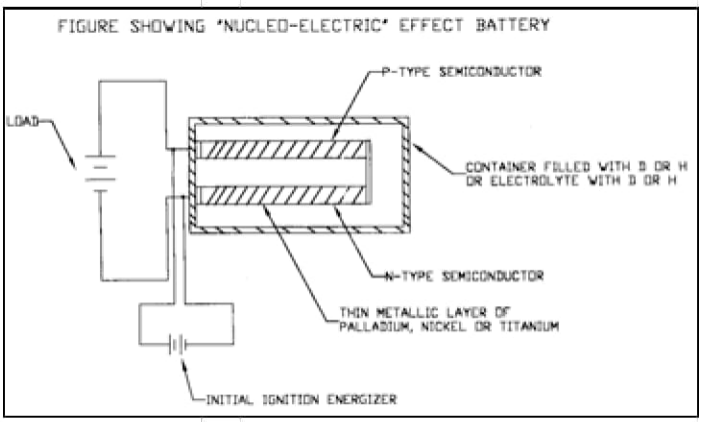
References:

1. G. H. Miley, "Nuclear Transmutations in Thin-Film Nickel Coatings Undergoing Electrolysis," *Infinite Energy*, Vol. 2, No. 9, (July-August 1996), pp. 19-32 (ref. p.20).

2. H. Hora, J. C. Kelly, G. H. Miley, "Energy Gain and Nuclear Transmutation by Low-Energy p- or d-Reactions in Metal Lattices," *Infinite Energy*, Vol. 2, No. 12., (January-February 1997), pp. 48-52.

3. D. Moon, C. Bennett, "A New Cold Fusion Experimental Device," *New Energy News*, Vol. 5, No. 2, (June 1997), p. 4.

4. H. Hora, Garching, B. Kronast, "Neutron Pulse Source," United States Patent No. 3,444,377, May 13, 1969.



New Energy Times Archive

CHARGE CLUSTERS:

The Basis of Zero-Point Energy Inventions

by Moray B. King, June 1997
P.O. Box 859, Provo, UT 84603

Abstract

Many "free energy" inventions utilize (sometimes unwittingly) the phenomena of charge clusters, which may provide the coupling to the zero-point energy (ZPE) for their source of power. Shoulders demonstrates how to produce these micron-sized plasmoids, called EV's, and his measurements show they contain a net charge on the order of 100 billion electrons. Recent investigations of the EV suggest its anomalous stability is due to a thin, helical, vortex ring filament possessing an extraordinary poloidal rotational velocity. Such a vortex ring has characteristics similar to the well studied filamentation instability, an intensely tightening, force-free vortex that occurs in non-neutral plasmas; for an EV the filament closes upon itself. The vortex ring can be launched when ions in a highly polarized plasma (or dielectric during breakdown) rush toward a point cathode (or dendrite in a fracturing crystal) whose tip explodes in response to a sharp, electrostatic pulse. EV production is likely occurring in fractoemission, sonoluminescence and in most electrical discharges. If so, it can be the foundation for a unifying hypothesis to explain the energy source behind a wide variety of seemingly diverse inventions including Moray's and Correa's plasma tubes, Grigg's Hydrosonic Pump, Sweet's conditioned barium ferrite, Brown's electrogravitic capacitors, Gray's motor, Hyde's generator, and even cold fusion. The inventions which utilize fractoemission at their basis tend to retain the EV plasmoids, and their simple construction offers the opportunity for widespread replication.

Introduction

Could there be inventions that tap energy directly from empty space? That depends on the nature of the fabric of space. Today most scientist believe that empty space is simply a void. Across history, mankind believed just the opposite. For example, ancient Eastern philosophies viewed space as filled with an all-pervading energy called "prana." From the inception of Western science to the turn of the 20th century, space was thought to be filled with a hypothetical substance called *the ether* (*aether*), which would be the medium to support the propagation of light waves. When modeled as a material substance, the ether seemed contradictory. It had to be tenuous enough to allow matter to pass through it without notice, yet extremely rigid to manifest the high velocity of light. The null result of the Michelson-Morley experiment to detect the ether wind perhaps came as a relief to the scientific community, because they could simply accept the postulates of relativity, which yield the principle of Lorentz invariance, without dealing with a cumbersome theoretical artifact that would tend to deny it.

The principle of Lorentz invariance means the state of a physical system (i.e. laws of physics) are the same for all bodies (or observer frames of reference) when they are moving at any constant velocity in free space (an inertial frame). A simplistic, material model of the ether would immediately violate the principle since different observers would experience an ether wind as they move relative to it. Attempts to contrive hydrodynamic models where a material ether is dragged or flows beget complexity as the models are adjusted to recover Lorentz invariance, and in addition the etheric substance must be both tenuous to matter yet rigid for light. The principle of relativity with Lorentz invariance is so fundamental to physics, that the scientific community really can't be blamed for using Occam's razor to excise the belief in a material ether, for a simple void model yields the principle immediately.

Zero-Point Energy

However, the void model cannot explain the nature of light, which was why the ether was invented in the first place. Nor can classical physics explain the spectrum of blackbody radiation, or even why electron atomic orbits don't collapse. The resolution occurred in the 1930's with the theory of quantum mechanics, a mathematical formalism that modeled atomic processes remarkably well. The equations contained a term that represented an underlying, energetic jitter inherent in all processes in nature. The jitter was called the "zero-point fluctuations" (ZPF) or "zero-point energy" (ZPE), since the energy is not thermal and is present at absolute zero degrees Kelvin. Dirac[1] proposed that the source of the jitter was from the fabric of space itself, and it could manifest short-lived pairs of elementary particles, each with their corresponding antiparticle. These were called "virtual" due to their short lifetimes. The discovery of anti-matter and particle pair production in accelerator experiments popularized Dirac's view of space. In the 1940's the theory of quantum electrodynamics[2] was established that heavily relied on the action of the virtual particles to explain atomic interactions with electromagnetic fields. The theory was so successful and accurate, it became the ansatz (pattern) for later theories to model the weak and strong nuclear interactions. In face of such success, do virtual particles really come into physical existence, or are they just an imaginary, theoretical construct?

Rather than have the virtual activity as a theoretical artifact, the theory of stochastic electrodynamics[3] places the zero-point energy at the foundation of all processes in physics, and it shows how quantum behavior arises from it such as blackbody radiation[4] and atomic stability.[5] Recent work has shown how the ZPE may also be at the foundation of macroscopic phenomena such as gravity[6] and inertia.[7] From this perspective, the ether has effectively re-entered physics, not as a material substance, but rather as comprised of highly concentrated fluctuations of electromagnetic field energy.

Stochastic electrodynamics postulates that the ZPE spectral energy density, the function that describes how much energy is stored in space at each frequency, must be Lorentz invariant. There is only one functional form that fulfills this postulate, and that is the energy density must be proportional to the frequency cubed.[3] The function's scaling constant is related to Planck's constant which completely specifies the description of the ZPE spectrum. The spectrum yields accurate results when used in calculations, but there is one philosophical problem: the energy density at every point in space appears to be infinite, since the spectral energy density keeps rising with frequency. Quantum electrodynamics suffers the same problem with its virtual particles, and uses a scheme of "renormalization" to subtract off infinities to leave a finite residue when making calculations. In a practical interaction with matter, the very high ZPE frequencies would be too fast to be absorbed. Nonetheless, the question remains: from where does the zero point energy come, and how can it appear infinite at every point in space? Likewise, where do these virtual particles come from that pop in and out of space?

Wheeler[8] answers these questions in his "already unified" theory that combines stochastic electrodynamics with general relativity called "geometrodynamics." General

New Energy Times Archive

relativity shows that when mass or energy density become large, the fabric of space bends into a fourth dimension, and with sufficient density pinches into a hyperspatial form called a "wormhole." The wormhole channels the zero-point energy in the form of electric flux (high density field lines) in a direction orthogonal to our three dimensional space. Flux appears to enter our space through "mini white holes" and leave through "mini black holes." The size of these holes are on the order of the Planck length, 10^{-33} cm. The energy density is enormous, 10^{93} g/cm^3. As the orthogonal flux passes through our space, the mini holes are constantly being created and destroyed in a chaotic maelstrom called the "quantum foam." Vorticity in the flow would manifest as elementary particles. A directional bias in the flow would manifest as vacuum polarization. In this model the elementary particles are like whirlpools sustained by the fourth dimensional flux. Wheeler's geometrodynamics is perhaps the most powerful of the ZPE theories, and if we could find a means to control and coherently channel some of that orthogonal flux into our three space, novel technologies to tap appreciable energy as well as control inertia or gravity might be possible.

Vacuum Polarization

The technical question becomes how can we most influence the ZPE flux? Quantum electrodynamics shows that the different elementary particles have different vacuum polarization interactions with the zero-point energy.[9] In particular, electrons, especially in standard conductors, are effectively in equilibrium with the zero-point fluctuations and manifest the entire interaction as a distributed electron cloud.[10] No net vacuum energy absorption could be expected from standard conductors and antennas. Nuclei on the other hand exhibit steep lines of vacuum polarization converging onto the particle. Whenever nuclei undergo abrupt motion or collisions, appreciable vacuum polarization effects occur yielding precipitation of new particles as well as exotic coherent vacuum states.[11] Plasmas during ion-acoustic resonance have exhibited energetic anomalies[12] whose source could be a coherent macroscopic vacuum polarization[13-14] across the plasma. Recent analysis[15] has shown that the abrupt motion of a dielectric boundary triggers real photons from the ZPE into existence. The energy production is proportional to the fourth derivative of the dielectric's velocity, which is an indication that the motion must be sharply abrupt. Sharp, abrupt motion of matter is a technical key to tapping the zero-point energy.

Sonoluminescence

Eberlein[16] extended her analysis of a dielectric boundary's interaction with the ZPE to explain sonoluminescence, a phenomena where a 50 picosecond light pulse is triggered by a collapsing air bubble in water excited by ultrasonics.[17] An abrupt squeeze and release is provided by the bubble's dielectric boundary which exhibits an appreciable fourth derivative of velocity at the turn-around point (minimum radius) where the surface changes direction. The sharp squeeze and release is similar to the proposal of using sharply pulsed, bucking electromagnetic fields to create a pulsed scalar excitation, which induces a slight "orthorotation" (twisting) of the fourth dimensional ZPE flux into our three dimensional space.[18] Sonoluminescence uses the nuclei in the polarized dielectric, bubble boundary to provide the bucking (scalar) squeeze field. The abrupt, noninertial movement of matter, especially plasma nuclei, appears to be an excellent activator of the vacuum energy.

The trick now is to absorb that energy. Eberlein's study of single bubble sonoluminescence shows that even though the emitted spectrum appears similar to a blackbody radiator at 40,000 degrees Kelvin, it is not a high temperature phenomenon, but rather is an artifact of the ZPE spectrum in its interaction with the bubble boundary. (The artifact might even be expected in view of Boyer's calculation[4] showing how the blackbody spectrum can be derived from the ZPE spectrum). In particular, the lower frequency components of the blackbody spectrum are absent, which result in little interaction with the water to form heat or produce molecular disassociation. The absence of plasma recombination emissions or ion radicals in the single bubble experiments support the thesis that heat is not being produced.[16] Thus, even through we are activating the vacuum energy into light pulses, the light propagates away, unless we arrange for a means to absorb it.

Resonant Absorption

Eberlein's analysis shows that the bubble at its minimum radius (about one micron) does exhibit a resonant interaction with the emissions causing an enhancement by a factor of a thousand. Creating a resonant absorber is another key, especially if the high frequency energy can be converted to a more useful form. Perhaps Mead's[19] nonlinear, microscopic resonators designed to absorb very high frequency ZPE fluctuations and emit low beat frequencies would respond well if it were in contact with the bubbles. Inducing a plasma in the water might likewise provide the opportunity for resonant absorption. Meyer[20] used multiple excitation methods (electromagnetic, light, and ultrasonics) simultaneously to dissociate water *[Editor's Note: It is not known whether Meyer really has an remarkable process at all: he has been unwilling to allow anyone to measure the performance of his demonstration cells.—EFM]*, and Puharich[21] electrically stimulated water at the resonant frequency of its hydrogen-oxygen bond to dissociate it. Both inventors induced a plasma in water electrically excited at frequencies in the ultrasonic band and claimed a net energy gain in their systems. Inducing turbulence and cavitation in water might also produce plasma yielding a resonant interaction and absorption of ZPE. Griggs[22] claims to produce heat in excess of his input energy via cavitation in his hydrosonic pump, and Keely[23] claimed excess energy in his water motor based on a turbulent operation similar to water hammer vibrations. Schauberger[24] likewise claimed anomalous energy by causing water to flow in a precessional, turbulent manner through carefully crafted pipes where the flow manifested a characteristic bluish glow akin to sonoluminescence. Also there are cold fusion projects using ultrasonic stimulation producing excess heat.[25,26] Direct evidence for plasma phenomena in water was recorded by Matsumoto[27] where tracks of a small plasmoid (like ball lightning) were photographed. If boundary conditions or turbulence can deform a spherical sonoluminescent bubble toward a pancake shape,[28] the center could pinch and transform it into a plasmoid vortex ring.[29] Plasmoids[30] just might be an ideal resonant absorber of the zero-point energy.

Plasmoids

Plasmoid was the name given by Bostick[31] for a stable, plasma vortex ring he created with abrupt electric discharges. His studies indicated that the plasmoid particles would flow in a helical fashion with the helix closing onto itself producing a toroid. The plasmoid particles undergo a precessional motion (a spin of a spin) with a poloidal spin closing into a toroidal spin. Could such a flow be a natural orthorotator of the four dimensional ZPE flux? DePalma's study[32] of forced precession in a mechanical system exhibited gravitational and inertial anomalies. If the ZPE is the basis of inertia, then it would likewise be the basis of angular momentum. Since systems normally resist precessional motion, a force-free system exhibiting precession would be surprising. If such a system alters the ZPE flux, then it might seem to inertially disconnect from the three space universe, a sort of "Machian" disconnection. (Mach originally proposed the principle that the basis of inertia was the gravitational influence of the "fixed stars"). Moreover such a system would contain excess energy provided from the ZPE flux. Could the ZPE—plasma system have a natural stability in the vortex ring form? Reed[33] has suggested that the mathematical modeling by Beltrami of the force-free vortex might provide the engineering foundation for manipulating the ZPE. The force-free vortex can taper like a tornado and concentrate an extreme energy density toward a point, making it a potentially good activator for ZPE coupling. Such vor-

New Energy Times Archive

tex filaments have been observed in plasmas (known as the "filamentation instability"[34,35,36]), and they tend to occur in counter-rotating pairs[37] (Figure 1). Bostick also observed plasmoids to be formed in pairs with opposite helicity arising from plasma turbulence. Could such a model be archetypal and likewise represent vacuum polarization pair production from the turbulent "virtual plasma" of the quantum foam?[33,39,40] The vortex filament from a violent electrical discharge has been observed to sometimes form rings[41] (Figure 2), which has been suggested to be the basis of ball lightning formation. Ball lightning has also been modeled as a vortex ring,[42] and its anomalous energy content suggest that it might be cohering the zero-point energy.[43, 44] A careful investigation could occur if we could reliably reproduce ball lightning in the laboratory.

Charge Clusters

It appears that a phenomenon like a miniature form of ball lightning has been discovered and is reproducible in the laboratory. Shoulders[45] has shown that impressing a sharp, negative pulse through a pointed cathode in contact with a dielectric positioned on top of a plate anode (Figure 3) launches a micron sized, negatively charged cluster that he named "Electrum Validum"(EV). Mesyats[46] claimed the same discovery and named it an "ecton." Historically, Le Duc[47] documented this phenomena in his research predating 1900. Shoulders has measured that the one micron diameter EV contains approximately 10^{11} electrons and 10^{6} ions. When launched, it typically travels at a velocity about one tenth the speed of light. Shoulders has shown that when an EV strikes an anode it produces an electrical pulse which contains more energy than it took to create it. Moreover, when the EV passes through a coil (or in parallel to a serpentine shaped conductor), a pulse is induced on the coil which also exhibits a greater energy output than the original input. Shoulders and Puthoff[48] suggest that the excess energy is from the ZPE. Mesyats shows that the ecton is launched as a result of an explosive emission from the cathode tip. Just prior to the emission the cathode melts, and an extremely sharp, liquid jet extends from it. The explosion destroys the sharp tip of the electrode, and it is difficult to reuse it to launch another ecton. Shoulders uses liquid metal (e.g. mercury) to maintain the tip and thus keeps it a source for repeatable launching. Shoulders also covers the cathode by a hollow dielectric shroud (Figure 4) designed to separate the EV from all the residual ions in the explosive emission. In addition the shroud might offer another possibility to enhance the effect. Mesyats has shown that a surface plasma on the dielectric amplifies the explosive emission. If Shoulders' shroud could be used like a hollow cathode electrode[49] that accumulates a glow plasma just before firing, the explosive emission through the glow plasma might launch a larger and even more powerful EV.

Experimental support for empowering the EV from a glow plasma may arise from the research of Correa[50] whose tubes are designed to build up a cathode glow which then pulses, a phenomenon known as the "abnormal glow discharge." Correa provides a circuit to restrict the current such that the lossy, vacuum arc discharge that follows is immediately quenched, and causes the tube to pulse at a chosen repetition rate. Correa has measured a significant over unity energy gain from his tubes, and has likely rediscovered the operating principle of the plasma tubes of Moray.[51,52] The research of Mesyats supports the conjecture that the abnormal glow discharge can launch EV's, and these are likely the source of the energy anomalies in inventions that involve electric discharges.

The theoretical stability of EV's presents difficulties. A simple spherical model of 10^{11} electrons would fail due to Coulomb repulsion. Ziolkowski and Tippett[53] proposed a collective plasma system interacting with localized electromagnetic waves. The analysis uses a vacuum polarization displacement current term that manifests a sort of "quantum potential" that compensates for the expansion forces. Such a term is sign)ficant only if the formation time of the EV is on the order of a femto second (10^{-15} sec). The analysis involves plasma flow vorticity, but it is not clear what geometry the flow takes. Jin and Fox[54] have proposed a toroidal vortex ring using a classical, nonrelativistic analysis of a nonneutral plasma. They show that a launched spherical charge distribution would not be stable, but rather would naturally pinch into a vortex ring. The analysis attempts to show that the poloidal rotation of the vortex ring could produce a large enough magnetic field to attract the outer circulating electrons in a diocotron[36] slipping stream flow. The poloidal rotational velocity would have to be extraordinary, and the stabilizing ring would have to be an extremely thin filament to keep the poloidal electron velocities well below the speed of light. The calculated energy densities within the filament would be greater than a neutron star. At such energy densities vacuum polarization effects would come into play and should really be included in the model. Also the EV's polarization interaction with the dielectric guide is a stabilizing factor and should likewise be included. A classical, nonrelativistic analysis is probably not sufficient to accurately model the EV. Nonetheless, the suggestion that a thin filament vortex ring is the underlying geometry of the EV can be supported from studying the filamentation instability whose imploding, tightening tendency is recognized to produce extremely high energy densities. Since quantum electrodynamic effects are sign)ficant at high energy densities, a complete model of the EV should also include a spectral interaction with the zero-point energy since the thin plasma fil-

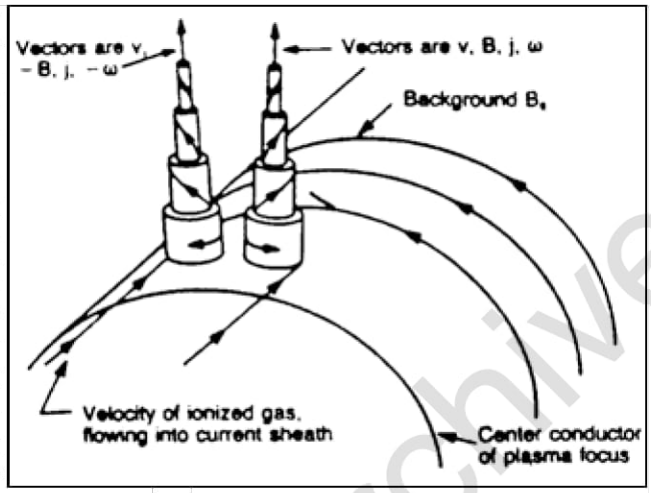


Figure 1. Counter rotating plasma vortex filaments.

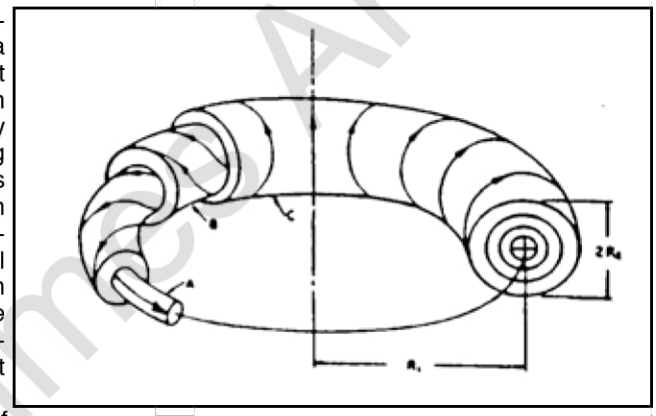


Figure 2. Helical flow in plasma vortex ring.

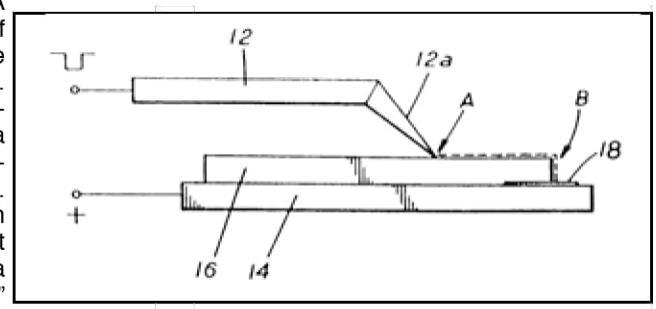


Figure 3. Launching EV plasmoid from sharp pointed cathode (12a) in contact with dielectric plate (16) on top of metal anode (14).

New Energy Times Archive

ament would exhibit a resonant coupling with the short wavelength, high frequency, and thus more energetic portion of the ZPE spectrum.

It appears that the ions in the polarized glow plasma and the exploding liquid metal cathode tip combine to create an abrupt compression that forms and energizes the charge cluster vortex ring. Just prior to the explosive emission, the polarized glow plasma and the polarized, liquid metal protuberance form two symmetric, boundary layers surrounding the surface electrons. The explosive emission launches the surface electrons as well as the metal tip, ion boundary layer (Figure 5). The emitted electron cloud then experiences a tremendous explosive compression between the two symmetric ion layers. The metal tip, ion layer punches through the glow plasma layer, creating turbulence which initiates the poloidal rotation of the vortex ring. The perfect boundary symmetry from the liquid protuberance and glow plasma not only causes an abrupt scalar compression which polarizes the vacuum and orthorotates the ZPE flux, but it also provides the needed boundary conditions to create a tight vortex filament that is closed upon itself trapping the excess energy.

Shoulders' observations of the EV's support the conjecture that they are like vacuum energy pumps. As the EV propagates down a dielectric guide, it is constantly ionizing the dielectric surface, emitting electrons and emitting light. Yet the EV does not decay. It yields the same pulse when it hits the anode regardless of the distance it travels in the guide. Also, when the high velocity EV triggers a pulse on a surrounding coil, it likewise does not decay. Moreover, the output pulse from the coil exceeds the input pulse that originally launched the EV. The EV must keep moving to remain stable, and seems to "feed" from its environment, absorbing electrons preceding it and shedding electrons in its wake.

Nuclear Transmutation

When the EV strikes the anode it damages the plate leaving small craters. Some craters exhibit a wider, explosive characteristic and these contain a further surprise: X-ray microanalysis of the crater show a wide range of elements that were not present before the strike implying that the EV induced nuclear transmutations.[55,56] Shoulders has proposed that since the EV can carry about 10^6 ions (or protons in a hydrogen gas experiment), it can accelerate the protons with sufficient kinetic energy to overcome the Coulomb barrier and penetrate the lattice nuclei triggering transmutation events. A classical calculation[57] supports Shoulders' hypothesis. The microanalysis of a palladium target showed magnesium, calcium, silicon, gallium and gold, all from a single EV strike. Shoulders has named the EV carrying nuclei, "Nuclear Electrum Validum" (NEV). The NEV's are created whenever the deuterium loaded palladium (or hydrogen loaded nickel) cracks internally producing the NEV by fractoemission. Fractoemission[53] has been observed to produce light emissions in experiments where a crystal is cracked. The emissions exhibit an anomalous persistence, sometimes for hours. Fractoemission is akin to earthquake lights where a phenomenon like ball lightning arises from an earthquake fissure. The hypothesis that fractoemission of NEV's is the energy source behind cold fusion gains further support from the fact that the anomalous heat in the bulk palladium experiments does not arise immediately after loading the palladium to saturation (it only takes three hours), but rather occurs after hundreds of hours, and then in bursts.[59] Like sonoluminescence, the cracking event is an extremely abrupt microscopic motion. The abrupt motion of the lattice nuclei can produce charged, dendritic edges ideal for EV production. If EV's are produced in the cold fusion experiments, then they might not only be the source behind the transmutation events, but could also produce excess heat directly upon exploding. Thus the source of the excess heat in the cold fusion experiments[60] might be predominantly from the zero-point energy.

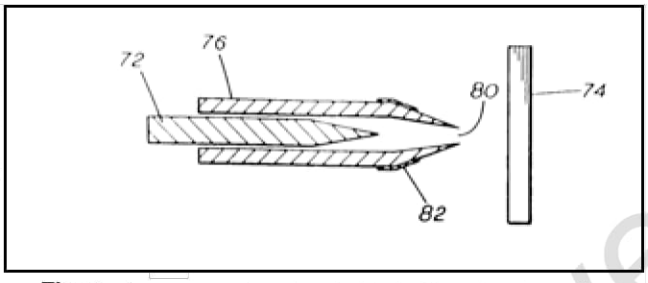


Figure 4. Cross section of cylindrical EV launcher. Dielectric shroud (76) surrounds pointed cathode (72) firing EV toward anode (74). Electrode band (82) is charged to half the anode voltage to repulse ions such that only the negative EV's are launched through the aperture (80).

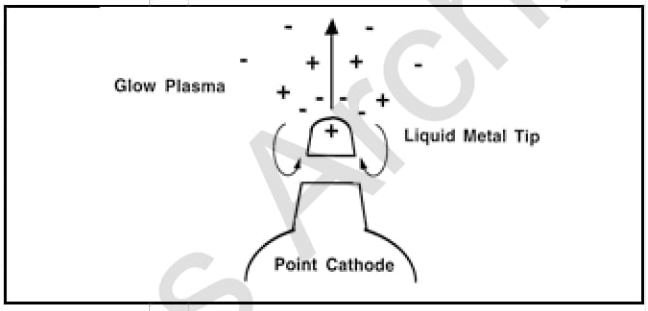


Figure 5. Explosive emission launches charge cluster vortex ring. The emitted electron cloud experiences an abrupt compression between two, symmetric, ion boundaries: The ions of the glow plasma rushing toward the sharp pointed cathode and the ions of the ejected tip of the liquid metal, cathode protuberance.

Fractoemission

Fractoemission on the interior of a dielectric might offer a means to trap and perhaps directly electrically couple to the EV. Mesyats notes that dielectric breakdown is often a launcher of EV's. In T.T. Brown's electrogravitic experiments6' 62 where a charged capacitor exhibits an acceleration in the direction of the positive plate, the greatest thrusts were observed during dielectric breakdown. Lambert-son's[63] ceramic/metallic composite might likewise have a fractoemission phenomena occurring within it to produce excess energy in his experiments. A possible hypothesis to explain the voltage overshoot and excess energy in Hyde's[64] generator might involve fractoemission within the dielectric spacers between the segmented stator elements. Also, Moray[51] used exotic and radioactive materials with his cold cathodes to produce surface, luminescent glow emissions. Could fractoemission also be involved?

The fractoemission plasma hypothesis has been proposed[39] to explain the anomalous energy production from a specially conditioned block of barium ferrite, in Sweet's[65] "Vacuum Triode Amplifier" (VTA), a well-witnessed, seemingly simple, self-running …"free energy" device. The hypothesis has gained further support from new information on the process of conditioning the barium ferrite, and offers the opportunity for further replication by others. Sweet's conditioned barium ferrite (typically 6x4x1 inch ceramic blocks) exhibited the peculiar ability to shift its magnetic field in response to a very weak magnetic stimulation. This is unusual because the magnetic domains in barium ferrite do not readily move, especially after being conditioned like a permanent magnet. Another peculiarity was the tendency for the field motion to resonate at 60 Hertz (or any other intended frequency imprinted via the conditioning process). The conditioning steps39 involved first driving the barium ferrite at 60 Hertz (2 amps) via a coil (600 turns of No. 28 wire) surrounding its perimeter, and then abruptly pulsing the coil from a charged capacitor (6500 microfarads at 450 volts). The pulse is fired at the peak of the 60 Hertz waveform. Also the ceramic block was sometimes sandwiched between charged plates to impress a 20 kilovolt electrostatic potential across it during the conditioning process. No investigator claimed success in replication until one[66] tried a preliminary step: First dip the barium ferrite ceramic block into liquid nitrogen. Then the other conditioning steps could induce multiple cracks in the ceramic, loosening its grains. The easily moved, magnetic fields would occur due to pivoting grain motion (not magnetic domain

New Energy Times Archive

motion), and such grain motion could be constantly creating and stimulating fractoemission plasmoids trapped within the cracks. (The plasmoids would tend to persist because barium ferrite has a low conductivity and acts like a dielectric.) Sweet used pickup coils above the ceramic to receive the anomalous energy that would be produced when the ceramic block was driven by a weak 60 Hertz magnetic field from the side. If the fractoemission hypothesis applies, Sweet may have discovered an elegant way to magnetically couple to EV plasmoids trapped within a dielectric and extract excess energy from them.

Sparking Devices

Perhaps the most common way to extract energy associated with EV's is to absorb their pulses when they hit the anode. Shoulders has shown that the EV's tend to be the first portion of the plasma launched in discharge events. Correa has shown likewise: the anomalous excess energy only occurs from the anomalous glow discharge, the precursor to the lossy vacuum arc discharge. Pappas[67] has proposed that electric sparks produce excess energy, a hypothesis seemingly confirmed by Shoulders and Correa if the spark is of short duration. Dufour[68] has also observed excess heat produced from sparks in his "cold fusion" experiment involving a pure hydrogen gas tube with stainless steel electrodes. Anomalous energy production seems to also occur in underwater, carbon arc discharge experiments[69] that produce the hydrocarbon fuel COH_2. Newman's[70] large discharging coil and Gray's7' motor both exhibit abrupt sparking phenomena, and both inventors have claimed excess energy production. The Swiss ML Converter[72] is a famous, self-running energy invention involving counter rotating acrylic disks (segmented like a Wimshurst machine) that produces a bright corona between the disks. Could the corona plasma be comprised of EV's who yield their energy by discharging into the rectifier circuit? Rectifying and efficiently absorbing the energy of large voltage spikes, like those produced by EV anode strikes, is a challenging engineering task. If solved, it could facilitate direct electrical energy conversion in any device where abrupt electric discharges (and EV production) are occurring.

A pulse current multiplier (PCM) circuit (Figure 6) has been proposed[52] as a means of converting low power, but extremely high voltage spikes into lower voltage, higher current, wider width pulses that could be rectified by standard circuits. The PCM is similar to a standard voltage divider circuit where a bank of capacitors are charged in series and discharged in parallel. Instead of switches, blocking inductors are used to guide the input voltage spikes down the low impedance, series path. The PCM circuit allows the efficient conversion of weak, electrostatic voltage spikes, which if summed in sufficient quantity, could produce abundant energy as demonstrated by the invention of Hyde.[64] If EV phenomena occur in all electrostatic discharges, then the PCM could provide an efficient method for converting the high voltage discharges and might provide the foundation for a practical device to tap the zero-point energy.

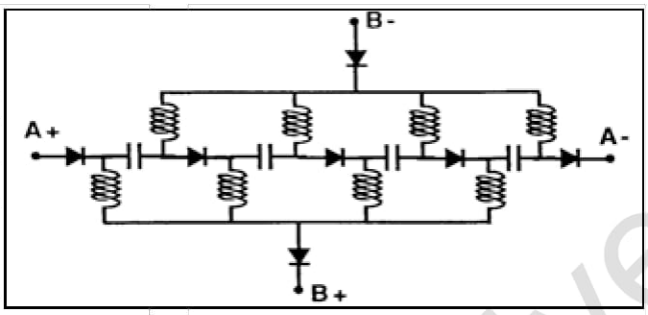


Figure 6. **Pulse Current Multiplier (PCM) converts unipolar voltage spikes (input on the A terminals) to current pulses (output on the B terminals). Four stages are shown, but in practice ten or more should be used.**

Summary

Despite the beliefs of most of the scientific community, modern physics has accepted that empty space is filled with energetic electromagnetic fluctuations called the zero-point energy. The most powerful model has the ZPE source as a flux from hyperspace. All matter interacts with the ZPE and generally is in equilibrium with it. However, when abrupt matter motion occurs, especially with nuclei, some of the ZPE flux is twisted into our space and can manifest excessive energy. Sonoluminescence may be an example of trapping the energy in a short lived, microscopic resonant structure. The energy may likewise be trapped in microscopic vortex ring plasmoids called EV's. The plasmoid vortex ring might be a natural, resonant orthorotator of the ZPE flux which would cause it to behave like a vacuum energy pump. Since EV's appear to be a precursor within any electric discharge, they may be the source behind the "free energy" machines involving electrical discharges. The excess energy would manifest as high voltage spikes, and an efficient way to convert the spikes to a more useful waveform is by use of a pulse current multiplier circuit. Thus the ZPE coherence induced by the EV could be output directly as electricity.

Long lived EV plasmoids could be produced during fractoemission. They have been proposed to be the cause of excess heat as well as transmutation in the cold fusion experiments. EV's could carry and accelerate ions with sufficient kinetic energy to penetrate the Coulomb barrier of target nuclei, and thus act as microscopic particle accelerators to cause the transmutation of the lattice nuclei. Trapping EV's via fractoemission within the interior of a dielectric might be the most efficient method for extracting their energy since they would tend to persist. Conditioning a barium ferrite ceramic block to maximize internal cracking to promote fractoemission might be the key to replicating Sweet's self-running energy device. If other researchers become successful in reproducing the barium ferrite conditioning, it would set the stage for widespread replication of perhaps the simplest "free energy" device ever invented. Whether EV's trigger pulses on nearby coils, strike anode plates, or get trapped within a dielectric, they appear to provide a unifying hypothesis to explain a wide range of energy devices whose source is apparently from the zero-point energy.

References

1. Dirac, P.A.(1930), *Roy. Soc. Proc.*126, page 360 Also G. Gamow (1966), *thirty Years that Shook Physics*, Double Day, NY.

2. Feynman, R.P. (1985), *QED: The Strange Theory of Light and Matter*, Princeton University Press, Princeton NJ.

3. Boyer, T.H.(1975), "Random Electrodynamics: The theory of classical electrodynamics with classical electromagnetic zero-point radiation," *Phys. Rev. D* 11 (4), pages 790-808.

4. Boyer, T.H.(1969), "Derivation of Blackbody Radiation Spectrum without Quantum Assumptions" *Phys. Rev.* 182(5!, pages 1374-83.

5. Puthoff, H.E.(1987), "Ground state of hydrogen as a zero-point fluctuation determined state," *Phys. Rev. D* 35(10), pages 3266-69.

6. Puthoff, H.E.(1989), "Gravity as a zero-point fluctuation force," *Phys. Rev. A* 39(5), pages 2333-42.

7. Haisch, B. and A. Rueda, H.E. Puthoff (1994), "Inertia as a zero-point field Lorentz force," Phys. Rev. A 49(2), pages 678-694.

8. Wheeler, J.A.(1962), *Geometrodynamics*, Academic Press, NY.

9. Scheck, F.(1983), *Leptons, Hadrons and Nuclei*, North Holland Physics Publ., NY, pages 213-223.

10. Senitzky, I.R.(1973), "Radiation Reaction and Vacuum Field Effects in Heisenberg-Picture Quantum Electrodynamics," *Phys. Rev. Lett.* 31(15), page 955.

11. Celenza, L.S. and V.K. Mishra, C.M. Shakin, K.F. Liu (1986), "Exotic States in QED," *Rev. Lett.* 57(1), page 55; Caldi, D.G. and A. Chodos (1987), "Narrow e+e- peaks in heavy-ion collisions and a possible new phase of QED," *Phys. Rev. D* 36(9), page 2876; Jack Ng, Y. and Y. Kikuchi (1987), "Narrow e+e- peaks in heavy-ion collisions as possible evidence of a confining phase of QED," *Phys. Rev. D* 36(9), page 2880; Celenza,L.S. and C.R. Ji, C.M. Shakin (1987), "Nontopological solitons in strongly coupled QED," *Phys. Rev. D* 36(7), pages 2144-48.

12. Sethian, J.D. and D.A. Hammer, C.B. Whaston (1978), "Anomalous Electron-Ion Energy Transfer in a Relativistic-Electron-Beam Heated Plasma," *Phys. Rev. Lett.* 40(7), page 451; Robertson, S. and A. Fisher, C.W. Roberson (1980), "Electron Beam Heating of a Mirror Confined Plasma," *Phys Fluids* 32(2), page 318; Tanaka, M. and Y. Kawai (1979), "Electron Heating by Ion Acoustic Turbulence in Plasmas," *J. Phys. Soc. Jpn.* 47(1), page 294.

13. King, M.B.(1984). "Macroscopic Vacuum Polarization," *Proc. Tesla Centennial Symposium*, International Tesla Society, Colorado Springs, pages 99-107. Also (1989), Tapping the ZeroPoint Energy, Paraclete Publishing, pages 57-75.

14. Rausher, E.A.(1968), "Electron Interactions and Quantum Plasma Physics," J. Plasma Phys. 2(4), page 517.

15. Barton, G. and C. Eberlein (1993), "On Quantum Radiation from a Moving Body with Finite Reii-active Index," *Ann. Phys.* 227, pages 222-274.

New Energy Times Archive

Theoretical analysis of matter in motion interacting With the ZPE. Real photons from the ZPE are created via abrupt motion

16. Eberlein, C. (1996), "Sonoluminescence as Quantum Vacuum Radiation," *Phys. Rev. Lett.* 76, pages 3842-45; ...(1996), "Theory of quantum radiation observed as sonoluminescence." *Phys. Rev. A* 53, pages 2772-87.

Theory that sonoluminescence energy is from a resonant interaction with the ZPE.

17. Barber, B.P. and S.J. Putterman (1991), "Observation of synchronous picosecond sonoluminescence," *Nature* 353, pages 318-320; ... (1992), "Light Scattering Measurements of the Repetitive Supersonic Implosion of a Sonoluminescing Bubble," *Phys. Rev. Lett.* 69, pages 3839-42.

18. King, M.B.(1986), "Cohering the Zero-Point Energy," *Proc. of the 1986 International Tesla Symposium*, Colorado Springs, section 4, pages 13-32. Also (1989), *Tapping the Zero-Point Energy*, Paraclete Publishing, pages 77-106.

19. Mead, F.B. (1996), "System for Converting Electromagnetic Radiation Energy to Electrical Energy," U.S. Patent 5,590,031; printed in *Infinite Energy* 2(11), pages 29-34.

System of pairs of microscopic resonators tuned to the high frequency modes of the ZPE. The pairs interact and are tuned to slightly different frequencies so as to emit the beat, difference frequency, which could readily be absorbed by standard circuits. Arrays of microscopic resonators might allow a practical, solid state method to tap the ZPE.

20. Meyer, S.L.(1991), *The Birth of a New Technology*, Water Fuel Cell, Grove City, OH; ... (1989), "Controlled Process for the Production of Thermal Energy from Gases and Apparatus Useful Therefore," U.S. Patent No. 4,826,581; (1990), "Method for the Production of a Fuel Gas, (Electrical Polarization Process)," U.S. Patent No. 4,936,961.

21. Puharich, A.(1981), "Water Decomposition by Means of Alternating Current Electrolysis," *Proc. First International Symposium on Nonconventional Energy Technology*, Toronto, pages 49-77; ... (1983), "Method and Apparatus for Splitting Water Molecules," U.S. Patent No. 4,394,230.

22. Rothwell, J.(1996), "Notes on the Talk by James Griggs of Hydro Dynamics, Inc. at the Cold Fusion & New Energy Symposium, January 20, 1996," infinite Energy, v 1 (5&6), pages 25-27.

23. Pond, D.(1994), "The Keely Motor - How It Works," *Proc. Int. Symp. on New Energy*, pages 359-371.

24. Alexandersson, 0. (1990), L*iving Water: Viktor Schauberger and the Secrets of Natural Energy*, Gateway Books, Bath, UK. Also Frokjaer-Jensen, B.(1981), "The Scandinavian Research Organization and the Implosion Theory (Viktor Schauberger)," Proc. First International Symposium on Nonconventional Energy Technology, Toronto, pages 78-96.

25. Bensen, T.(1995), "A Micro-fusion Reactor: Nuclear reactions in the cold by ultrasonic cavitation," Infinite Energy, 1 (1), pages 33-37.

Summarizes the invention of R. Stringham and R. George that uses ultrasonic cavitation to induce cold fusion in palladium foil in heavy water. Excess heat and helium are produced. Electron microscope photos of the foil show pock marks of melted and recooled metal.

26. Auluck, S.K.H. and V.K. Shrikande (July 1995), "Proposal for Replication of Stringham and George's Ultrasonic Cavitation Experiment," *Fusion Facts* 7(1), pages 9-10.

Discusses a pancake collapse model of a sonoluminescent bubble. It can launch a high velocity jet which can inject the contents of the bubble into any solid surface to which it has contact.

27. Matsumoto, T. (1996), "Extraordinary Traces Produced during Pulsed Discharges in Water," *"Cold Fusion"* 9, pages 17-21; (April 1995), "Artificial Ball-Lightning - Photographs of Cold Fusion," ICCF-5, abstract in *Fusion Facts* 6(10), pages 24-25; ...(May 1995), "Cold Fusion Experiments by Sparking Discharges in Water," ICCF-5, abstract in *Fusion Facts* 6(11), page 28.

Observation of tiny ball lightning phenomena in under water discharges for cold fusion experiments. Proposes the formation of hydrogen clusters to induce the fusion events.

28. Prevenslik, T.V.(1996), "Planck Energy and Biological Effects of Ultrasonic Cavitation," *"Cold Fusion"* 11, pages 7-10; ...(February 1996), "Biological Effects of Ultrasonic Cavitation," Fusion Facts 7(8), pages 8-9; ...(July 1996), "Ultrasound Induced and Laser Enhanced Cold Fusion Chemistry," *Fusion Facts* 8(1), pages 15-16.

Model for sonoluminescence has a spherical bubble collapsing into a pancake shape. Zero-point energy modes cohere sufficiently to dissociate water molecules.

29. Bennett, C. (1996), "A Theoretical Mechanism for Sonofusion," *"Cold Fusion"* 18, pages 4042.

Hypothesis that a sonoluminescent bubble collapses into a toroidal vortex ring. Particles accelerated through the center of the vortex have sufficient kinetic energy to generate fusion.

30. Lewis, E.H.(1995), "Tornados and Ball Lightning, " *Extraordinary Science* VII (4), pages 33-37; ...(March 1996), "Tornados and Tiny Plasmoid Phenomena," *New Energy News* 3(9), pages 18-20; ...(Feb 1994), "Some Important Kinds of Plasmoid Traces Produced by Cold Fusion Apparatus," *Fusion Facts* 6(8), pages 16-17; ...(October 1996), "The Plasmoid Theory," *"Cold Fusion"* 19, pages 37-44; ...(May 1995), "Plasmoid Phenomena," *New Energy News* 2(12), pages 9-10.

Overview of plasmoid phenomena including tornados, ball lightning, and microscopic EV's. Includes an abundant list of references.

31. Bostick, W.H.(1957), "Experimental Study of Plasmoids," *Phys. Rev.* 106(3), page 404; ...(October 1957), "Plasmoids," *Scientific American* 197, page 87.

32. DePalma, B.E. and C.E. Edwards (1973), "The Force Machine Experiments," privately published.

33. Reed, D. (1992), "Toward a Structural Model for the Fundamental Electrodynamic Fields of Nature," Extraordinary Science IV(2), pages 22-33; ... (1993), "Evidence for the Screw Electromagnetic Field in Macro and Microscopic Reality," *Proc. Int. Symp. on New Energy*, pages 497-510; ... (1994), "Beltrami Topology as Archetypal Vortex," *Proc. Int. Sym. on New Energy*, pages 585-608; ...(1996), "The Beltrami Vector Field - The Key to Unlocking the Secrets of Vacuum Energy?" *Proc. Int. Sym. on New Energy*, pages 345-363.

34. Nardi, V. and W.H. Bostick, J. Feugeas, W. Prior (1980), "Internal Structure of Electron Beam Filaments," Phys. Rev. A 22(5), pages 2211-17.

35. Benford, G.(1972), "Electron Beam Filamentation in Strong Magnetic Fields," *Phys. Rev. Lett.* 28(19), pages 1242-44; R. Lee, M. Lampe (1973), "Electromagnetic Instabilities, Filamentation and Focusing of Relativistic Electron Beams," *Phys. Rev. Lett.* 31(23), pages 1390-93; C.A. Kapetankos (1974), "Filamentation of intense relativistic electron beams propagating in a dense plasma," *App. Phys. Lett.* 25(9), pages 484-488.

36. Davidson, R.C.(1990), Physics of Nonneutral Plasmas, Addison-Wesley, NY.

Complete introduction to the topic of nonneutral (or charged) plasmas with abundant references to the scientific literature. The text provides the foundation for the mathematical modeling of nonneutral plasmas.

37. Bostick, W.H.(1966), "Pair Production of Plasma Vortices," *Phys. Fluids* 9, pages 2078-80.

38. Akimov, A.E. and G.I.Shipov (June 1996), "Torsion Fields and Their Experimental Manifestation," *Proc. Int. Sci. Conf. on New Ideas in Natural Science*, St. Petersburg Russia. Summarized by A. Frolov (March 1997), *New Energy News* 4(11), pages 12-14.

Torsion fields are a model of the physical vacuum similar to Dirac's model except it is comprised of annular wave packets of electrons and positrons instead of electron-positron pairs. Under appropriate conditions the polarized state of the vacuum can be turned into a spin field. Torsion field technology might allow tapping the vacuum energy, inertial propulsion and superluminal communication.

39. King, M.B.(1994), "Vacuum Energy Vortices," *Proc. Int. Sym. on New Energy,* pages 257269.

Hypothesis is proposed that counter-rotating plasma vortices can induce a macroscopic pair production of vacuum polarization displacement currents, and such activity yields a large ZPE coherence. An analysis of Sweet's VTA device proposes that fractoemission inside the barium ferrite ceramic (caused by the conditioning process) produces the plasma with grain pivoting inducing the counter-rotation.

40. Winterberg, F.(1990), "Maxwell's Equations and Einstein-Gravity in the Planck Aether Model of a Unified Field Theory," *Z. Naturforsch.* 45 a, pages 1102-16; ... (1991), "Substratum Interpretation of the Quark-Lepton Symmetries in the Planck Aether Model of a Unified Field Theory," *Z. Naturforsch.* 46 a, pages 551-559.

A model of the ether comprised of dynamic, toroidal vortex rings.

41. Alexeff, I. and M. Radar (1995), "Possible Precursors of Ball Lightning - Observation of Closed Loops in High-Voltage Discharges," *Fusion Tech.* 27, pages 271-273.

Closed current loops were photographed during high voltage discharges. The loops enclose a magnetic field of very high energy density. They contract and quickly become compact force-free loops that superficially resemble spheres. In these toroidal geometries, the trapped internal magnetic field balances the external magnetic field to provide an almost force-free configuration. The bibliography cites numerous references on ball lightning.

42. Johnson, P.0.(1965),"Ball Lightning and Self Containing Electromagnetic Fields," *Am. J. Phys.* 33, page 119.

43. Egely, G.(1986), "Energy Transfer Problems of Ball Lightning," Central Research Institute for Physics, Budapest, Hungary.

44. King, M.B.(1989), Tapping the Zero-Point Energy, Paraclete Publishing, Provo, UT; ... I ')') I). "Tapping the Zero-Point Energy as an Energy Source," Proc. 26th IECEC vol.4, pages 364-369, ... (1993), "Fundamentals of a Zero-Point Energy Technology," *Proc. Int. Sym. on New Energy*, pages 201-217.

45. Shoulders, K.R.(1991), "Energy Conversion Using High Charge Density," U.S. Patent No. 5,018,180.

Fundamental discovery on how to launch a micron size, negatively charged plasmoid called "Electrum Validum" (EV). An EV yields excess energy (over unity gain) whenever it hits the anode or travels down the axis of an hollow coil. The excess energy comes from the ZPE.

46. Mesyats, G.A.(1996), "Ecton Processes at the Cathode in a Vacuum Discharge," *Proc. 17th International Symposium On Discharges and Electrical Insulation in Vacuum*, pages 720-731.

Russian research is presented analyzing their discovery of charge clusters, called "ectons." Ectons often arise from micro explosions on the surface of the cathode, where surface imperfections such as micro protrusions, adsorbed gases, dielectric films and inclusions play an important role. The simplest way to initiate ectons is to cause an explosion of cathode micro protrusions under the action of field emission current. Experiments confirm micro protrusions jets can form from liquid or melting metal. The breakdown of thick dielectric films in their charging with ions also plays an important role in the initiation of ectons. A commonly used way to initiate an ecton is to induce a vacuum discharge over a dielectric in contact with a pointed, metal cathode. An ecton can readily be excited at a contaminated cathode with a low density plasma, but a clean cathode requires a high plasma density.

47. Le Duc, S. (1908), *Electric Ions and Their Use in Medicine*, Rebman Co., London.

48. Puthoff, H.E.(1990), "The energetic vacuum: implications for energy research," *Spec. Sci. Tech.* 1 3 (4), pages 247-257.

49. Gundersen, M.A. and G. Schaefer (1990), *Physics and Applications of Pseudosparks*, Plenum Press? NY.

Conference proceedings studying hollow cathode discharge phenomena. If a glow discharge is created in the interior of a hollow cathode, tremendous currents may be switched and triggered by a small external signal. The phenomena generates an intense beam of ions between the electrodes. The

New Energy Times Archive

initial stage of the discharge exhibits anomalous behavior including a negative resistance characteristic that is a powerful version of the abnormal glow discharge.

50. Correa, P.N. and A.N. Correa (1995), "Electromechanical Transduction of Plasma Pulses," U.S. Patent 5,416,391; "Energy Conversion System," U.S. Patent 5,449,989; ...(1996), "XS NRG™ Technology," *Infinite Energy* 2(7), pages 18-38.

Fundamental discovery that a plasma tube tuned to operate at the abnormal glow discharge region exhibits an over unity energy gain. The abnormal glow discharge is a glow plasma that surrounds the cathode just before a vacuum arc discharge (spark) that occurs when the tube is slowly charged with increasing voltage. The abnormal glow exhibits a negative resistance characteristic as the tube begins an arc discharge. The patents illustrate how to make an appropriate charging circuit to cycle the tube in the abnormal glow discharge regime, control the cycle frequency, avoid the losses of the vacuum arc discharge, and rectify the excess energy onto batteries.

51. Moray, T.H. and J.E. Moray (1978), *The Sea of Energy*, Cosray Research Institute, Salt Lake City.

52. King, M.B.(1996), "The Super Tube," *Proc. Int. Sym. on New Energy*, pages 209-221; also *Infinite Energy* 2(8), pages 23-28.

A powerful plasma tube intended to cohere the ZPE combines the use of a hollow cathode discharge, radioactive cathodes and inert gas mixtures; it operates in the abnormal glow discharge regime. Output energy in the form of large voltage spikes are efficiently absorbed by a pulse current multiplier (PCM) circuit which might offer a solid state means of tapping the vacuum energy.

53. Ziolkowski, R.W. and M.K. Tippett (1991), "Collective effect in an electron plasma system catalyzed by a localized electromagnetic wave," *Phys. Rev. A* 43(6), pages 3066-72.

Mathematical analysis of Shoulders' EV that includes a significant (vacuum polarization) displacement current term since the EV formation time is of the same order as the plasma frequency period. The resulting nonlinear Klein-Gordon equation contains vorticity terms and a term similar to a quantum mechanical potential which compensates for the repulsion. The system is solved by numerical methods for a stable, localized wave solution which matches the EV in size and charge density.

54. Jin, S.X. and H. Fox (1996), "Characteristics of High-Density Charge Clusters: A Theoretical Model," *J. New Energy* 1(4), pages 5-20.

A mathematical model of charged clusters (Shoulder's EV's) is presented that shows the stability is due to a helical vortex ring possessing an extraordinary poloidal circulation. In this nonrelativistic calculation, the poloidal filament would have to be thin. A spherical electron cluster is unstable and would tend to form into a toroid by a force balance relationship. The calculation shows that the energy density of the poloidal filament in a charge cluster is a hundred times higher than in a supernova explosion.

55. Shoulders, K. and S. Shoulders (1996), "Observations on the Role of Charge Clusters in Nuclear Cluster Reactions," *J. New Energy* 1(3), pages 111-121

Experimental evidence in the form of micrographs and X-ray microanalysis is presented suggesting that nuclear charge clusters, (micron sized plasmoids containing 10^{11} electrons and 10^{6} protons or deuterons) can accelerate into lattice nuclei with sufficient kinetic energy to overcome the Coulomb barrier and trigger transmutation events. The hypothesis to explain cold fusion is proposed where electrolytic loading nickel causes cracking and fractoemission of the charge clusters.

56. Shoulders, K. and S. Shoulders (1997), "Charge Clusters," Planetary Association for Clean Energy Newsletter 9(1). pages 13-17.

Overview of charge cluster research includes EV's produced by ultrasonics and cavitation charge separation.

57. Fox, H. and R.W. Bass, S.X.Jin (1996), "Plasma-Injected Transmutation," *J. New Energy* 1(3), pages 222-230.

Classical calculation showing that nuclear charge clusters can be produced at low energy and yet gain sufficient acceleration barrier and transmute lattice nuclei.

58. Preparata, G.(1991), "A New Look at Solid-State Fractures, Particle Emission and Cold Nuclear Fusion," *Il Nuovo Cimento* 104 A(8), page 1259; ... (1990), "Quantum field theory of superradiance," in Cherubini, R., P. DalPiaz, B.Minetti (editors), *Problems of Fundamental Modern Physics*, World Scientific, Singapore.

59. Bockris, J.(1996), "The Complex Conditions Needed to Obtain Nuclear Heat from D-Pd Systems," *J. New Energy* 1(3), pages 210-218.

The hypothesis is proposed that internal cracking of the cathode palladium (or nickel) is the needed triggering mechanism to obtain cold fusion or transmutation events. It explains why, even though it takes only three hours to load palladium rods to saturation, there can be delays of hundreds of hours before heat bursts occur. if the cracks should reach the surface, the deuterium fugacity is diminished and the reaction stops. Thin palladium nickel alloys or layers, as in Patterson's beads, allow the internal cracking to occur quickly giving reliable and repeatable results.

60. Patterson. J.(1996), U.S. Patent 5,494,559. J. Rothwell (1995), "'Highlights of the Fifth International Conference on Cold Fusion," *Infinite Energy* 1(2), pages 8-18.

The first US. "cold fusion" patent with the claim of excess energy (200 %) granted. The Patterson cell contains hundreds of sub millimeter beads made in a electroplating process of depositing multiple, alternating, thin layers of very pure nickel and palladium. It runs using a light water electrolyte. It is considered the best of the electrolytic cold fusion type of experiments with complete repeatability and a record gain of over 1000 in one demonstration.

61. Valone, T. (1994). *Electrogravitics Systems*, Integrity Research Institute, Washington DC.

62. King, M.B. (1976). "Is Artificial Gravity Possible?" *Tapping the Zero-Point Energy*, Paraclete Publishing, Provo, UT, pages 19-32.

63. Lambertson, W.A.(1994), "History and Status of the WIN Process," *Proc. Int. Sym. on New Energy*, pages 283-288.

64. Hyde, W.W. T.(1990). "Electrostatic Energy Field Power Generating System," U.S. Patent No. 4,897,592. The invention is summarized in King (1991), reference 44.

65. Sweet, F. and T.E. Bearden (1991), "Utilizing Scalar Electromagnetics to Tap Vacuum Energy," *Proc. 26th IECEC* vol. 4, pages 370-375; ... (1988), "Nothing is Something: The Theory and Operation of a Phase-Conjugate Vacuum Triode;" ... (1989), private communication.

66. Watson, D.(1996), private communication.

67. Pappas, P.T.(1991), "Energy Creation in Electrical Sparks and Discharges: Theory and Direct Experimental Evidence," *Proc. 26th IECEC* vol. 4, pages 416-423.

68. Dufour, J.(1993), "Cold Fusion by Sparking in Hydrogen Isotopes," *Fusion Technology* 24, pages 205-228.

69. Mallove, E.F. (1996), "AquaFuel and COH_2 Synthesis Gases - More Patents, New Measurements, Speculation..." *Infinite Energy* 2(10), pages 32-44; "AquaFuel - A Wonderful Fuel, but is it Over-Unity?" *Infinite Energy* 2(9), pages 44-48.

Carbon arcs underwater producing COH2 fuel manifests over unity efficiency.

70. Newman, J. (1984), *The Energy Machine of Joseph Newman*, Joseph Newman Publishing Co., Lucedale, MS. Review by M. Carrell (1996), *Infinite Energy*2(7), pages 54-58; special report by E. Soulé, pages 58-61.

71. Gray, E.V.(1976), "Pulsed Capacitor Discharge Electric Engine," U.S. Patent 3,890,548.

72. Matthey, P.H. (1985) "The Swiss ML Converter - A Masterpiece of Craftsmanship and Electronic Engineering," in H.A. Nieper (ed.), *Revolution in Technology. Medicine and Society*, Verlag, Odenburg.

FIR FROM

Read *The* Book on the Cold Fusion saga.....

Fire from Ice:

Searching for the Truth Behind the Cold Fusion Furor

By Eugene F. Mallove, Sc.D.
Published by John Wiley & Sons, Inc., 1991, 334 pp.

A timeless treatment of the greatest scientific drama of our age...Nominated for a Pulitzer Prize in 1991

"Eugene Mallove has produced a sorely needed, accessible overview of the cold fusion muddle. By sweeping away stubbornly held preconceptions, he bares the truth implicit in a provocative variety of experiments."
—JulianSchwinger
Nobel Laureate in Physics

"Fire from Ice is the only good book on the subject...."
—Arthur C. Clarke

Order your copy directly from author Dr. Eugene F. Mallove, who will personally inscribe and sign each book, at your request.

Send check or money order for **$25.95** (U.S. and Canada), to Cold Fusion Technology, P.O. Box 2816, Concord, NH 03302-2816. Or use credit card (MC, VISA, or AMEX).

(Note: price is $29.95 for other foreign countries)

New Energy Times Archive

CATALYTIC BEHAVIOR OF ONE (OR TWO) SUBQUARKS BOUND TO THEIR NUCLEAR HOST

Dr. Joseph L. McKibben
Crown Point Retirement Center, 737 Magnolia Ave., Apt 234, Corona, CA 91719-3172
Phone (909) 279-1773, E-mail JLMCKIBBEN@aol.comå

1. Introduction

The author has been on the trail of some unrecognized particles since 1981. After cold fusion was demonstrated to be possible by several methods, he published an article in *Infinite Energy*[1] entitled "Can Cold Fusion be Catalyzed by Fractionally-Charged Ions that have Evaded FC Particle Searchers?" In order to understand how these ideas got developed, one needs to read the first three sections of that paper. The author hoped that this paper would have stimulated someone to repeat the illuminating experiment discussed in it and would have obtained data that is fully credible, but that has not taken place. A second one page article[2] has been published recently that introduces the new ideas discussed below.

The data and our knowledge of quarks indicates that there exists nine components of quarks, but only six of these can come together and form pseudonuclei of atoms with integer charge, since negative hemitrons bind directly to nuclei. Since they all have one of three color charges, a couple of examples are shown on the front cover of this issue of *Infinite Energy* (Issue #13/14). First, notice the illustration with the notation pseudohelium nucleus. The red, green and blue colored areas represent particles that I have been calling subquarks. Their mass is ≈1.15 nucleons and their charge is +e/6, so a tiny black dot has been put at their center to represent that. The significance of their color charge is that they have a three-phase space-time relation to each other—electrons and positrons have a two-phase space-time relation to each other.

Surrounding the three subquarks are particles I am calling positive hemitrons, since their electrical charge is +e/2 and therefore the area of the center black dot is three times larger. Their mass appeared to be ≈0.15 nucleons from the data, but could have been 0.13 nucleons or exactly one ninth of the mass of the subquark. I have shown them with anticolor to red, green, and blue, which means each one has a two-phase space-time relation to one of the quarks. We were lucky in that in the 1967 experiment some of the -e/2 ions of pseudohelium atom got to the hot filament and the subquarks were emitted as -5e/6 ions. A tiny peak present suggests that just a few + hemitrons with an extra electron got onto the filament.

The second such illustration on the front cover shows each subquark embedded in a helium nucleus so the assembly is labeled pseudo-oxygen nucleus. If a hemitron is removed somehow, many were removed in the 1967 experiment, the pseudoatom was detected as a -e/2 ion. The nuclei attached to each subquark of a pseudoatom had identical Z and A values and that made the analysis easier. However, several different nuclear species were found attached to subquarks, so pseudonuclei of several different atoms were found to be present, but not in an abundance that the most sensitive mass spectrograph could directly detect.

Analysis of several subquark-nucleus bondings showed it to be ≈ 15 MeV for each nucleon in the nucleus. Moreover, it seems to be a quite stable bond—it does not change during interactions or even months. This is important in order that a subquark bound to a nucleus be a good catalyst.

Another very good catalyst is oxygen, with two attached subquarks having different colors. It is formed by an indirect process. The combination of three ^{9}Be each with a subquark leads to pseudosilicon when joined by three + hemitrons and eight electrons. However, pseudonuclei in which the triad components each have one more neutron than protons, like ^{9}Be, is unstable although with a very slow decay rate. In this case two ^{9}Be nuclei with their subquarks combine with the emission of a pair of neutrons so ^{16}O with two subquarks is formed. If this is joined by the emitted ^{9}Be-Sq and the three + hemitrons it would be pseudosilicon again, or type II pseudosilicon. This type II ion was very prominent in the 1967 data, as can be seen in my mass chart in *Infinite Energy* issue #4 inasmuch as its peak was quite far off scale.

O+2Sq ions are different, especially in water, as an extra electron is bound quite firmly so its charge is always -2e/3. All the other FC ions, that we are concerned with, are positive ions in water but were observed as negative ions from a negatively biased hot filament.

2. The Manner in which the Catalytic Particles Function

The first step in getting a catalytic particle to function is to get it out of its cocoon—two examples of the cocoon, actually called pseudonuclei, appear on the front cover. Three ways of doing this are: A. Bombard them with alpha particles, or the catalytic particle itself, as appears to take place in the Pons and Fleischmann and also the Patterson and Cravens methods; B. Disassociation in an arc run between carbon electrodes in water which also releases H_2 and CO gases. About 150% excess energy is generated due to the release of the catalytic particles in water; C. Bubbles in water that when they collapse, are said to be undergoing cavitation, and generate temperatures high enough to emit light. This process is now under intense development although there is considerable history involved.

We do not know how a Sq-^{4}He particle with its 60 MeV binding energy acts when free in water. Experimental determination of the force law between this particle and various nuclei is a very urgent problem in understanding cold fusion. Still, by analyzing some experiments, we can get considerable information. The force must be quite tiny at a separation of a micron but quite large near the surface where the two nuclei collide—the force is a consequence of the subquark rapidly moving back and forth between the two nuclei.

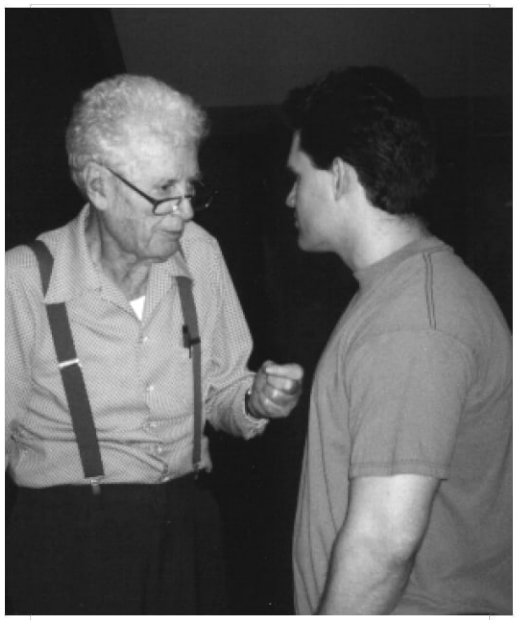
The formation of ^{4}He in a deuterium-loaded palladium cell became more complicated when it was noticed that palladium was being divided up into two nuclei by electrolysis by deuterated water. See Bockris and Minevski in *Infinite Energy* #5&6 or Mizuno et al in *IE* #7 for introduction to extensive work on this electrolysis. This suggests that when helium is formed that the catalytic particle is also on the palladium nucleus. The energy needed to split up the palladium nucleus comes out of the energy of formation of ^{4}He. Now a similar but more complicated thing happens in the Patterson cell—more complicated because two protons must be transformed into neutrons by positron emission. Miley and Patterson have done extensive work on the transformations occurring in both the nickel and palladium layers, see *IE* #9, p.19 and *IE* #12, p.48. Also see *IE* #12, p.48. Unfortunately, these reactions do destroy palladium and nickel in the lattice and that must mean that these two methods are not viable for prolonged heat production.

Production of AquaFuel or CO-H_2—see *IE* #10 p.12 for latest discussion. (Note that: "COH_2" is also the chemical formula for formaldehyde although it is normally written HCHO). The carbon arc production of H_2 and CO along with high temperature steam might work out to be quite versatile power source—for example it might be upgraded to powering jet aircraft with the boiler containing the arc and cold

New Energy Times Archive

fusion reactions being useful for preheating the incoming air. I believe the latest figure on the excess heat is 150%. It is plausible that the pseudo-oxygen content of the water might be increased significantly above the natural abundance. It might be possible to remove a positive hemitron from pseudo-oxygen atom by exposing water to radiation from a synchrotron light source, provided the energy is not above ≈6 eV. If so, the resulting ion could be removed by electrolysis. It seems logical that one of the reactions catalyzed by a Sq-^{4}He ion is iron from two carbon nuclei and two oxygen nuclei—how this works out is sketched below. According to my *Nuclear Wallet Cards*[4] element 28 or Ni with mass 56 would be formed with the release of 53.902 Mev of energy, but it would emit a positron with a 6.10 day half-life. That would form element 27 or Co with mass 56 and now the total release of energy would be 56.038 MeV and this would emit a positron with a 78.76 day half life. That forms element 26 or ^{56}Fe and now the total release of energy would be 60.604 MeV and the element is stable. It seems quite plausible that much of the radioactive decay takes place very rapidly while the ions are in an excited state very close to the catalytic ion.

In the author's opinion the most popular method of getting heat will be by cavitation. It will be ideal for heating homes and probably for driving automobiles too. Interest in this method was revived by a talk by James Griggs of HydroDynamics, Inc. at the *Cold Fusion and New Energy Symposium*, January 20, 1996 and reported in *IE* #5&6, p.25 by Jed Rothwell. Griggs was building large boilers for applications in explosive areas where it would be unsafe to have the boiler heated by gas. A large cylinder in drum-shaped cavity was driven by a 25 HP motor. He was merely attempting to increase the efficiency by drilling a large number of holes on the drum at the most effective angle. Then he found that the heat delivered to water was about 10% greater than the motor delivered and when working with steam it was 30% greater—this in spite of the fact that he knew nothing about the concept of cold fusion. Rothwell noted "He has verified that the excess heat is linked to cavitation bubbles that collapse in the fluid. He built a glass and plastic version of the pump and when this model was run at high speed so the rotor perimeter speed was the same as the large units, ultrasound and cavitation is observed." During the past year a cavitation device that is about a factor of ten more efficient has been developed, according to Mallove, but the details have not been revealed. He did state that the surface of the Griggs device outer-casing was covered with copper as a result of the reactions. Now four oxygen atoms coming together would form element 32 or ^{64}Ge. To get to element 29 or ^{63}Cu a neutron and two positrons would



Author of this article, Dr. Joseph McKibben (L), discusses transmutation theory with hot fusion investigator Prof. Barry Merriman of the UCLA Dept. of Mathematics. Both had come to *Planetfest 1997* in Pasadena to view the Pathfinder's landing on Mars, and also to hear Dr. Gene Mallove's invited talk, Advanced Space Propulsion with New Energy Technology

have to be emitted and 47.631 MeV of energy should be released. The neutrons being released mostly deep in water will hopefully not be too troublesome. It will be very interesting to follow developments that going to take take place in this device.

At the Planetary Society's *Planetfest 1997* meeting at Pasadena, on July 4th, Mallove showed a video of the June 11, 1997 Good Morning America program on the CETI radioactivity transmutation experiment. It depicted element 90 or ^{232}Th being disintegrated by a catalytic agent unknown to me. It was found to disintegrate into two atoms each of titanium and copper. If two each of heaviest isotopes are created, namely ^{50}Ti and ^{65}Cu are formed and it releases about 271 MeV of energy. Unfortunately two neutrons would normally be released too in such a reaction. This device looks great as a potential source of energy for driving a rocket at high velocity in space; however, taking care of the neutrons and other problems is something I am unable to properly discuss at this time until more is known of this process.

3. Evidence that Most of these Quarks Components did Form Nucleons.

Having proposed that the catalytic particle arise out of the existence of components of quarks, I shall now mention two pieces of experimental evidence that give support to that point of view. The April 1997 *Physics Today* carries an article[5] entitled "HERA Groups Find Excess Deep Inelastic $e^{+}p$ Scattering Events." Quoting: "Over the last four years, the H1 and ZEUS detector groups at DESY in Hamburg have been studying the interaction of 27.5 GeV positrons colliding with 820 GeV protons in the Hadron-Electron Ring Accelerator (HADRA). The events at the highest 4-momentum transfer explore a new kinematic regime, down to 10^{-16} cm. As early as 1994, some deep inelastic scattering events at very high momentum transfer were seen. Late last year, rumors became rampant in labs outside DESY that the H1 and ZEUS detectors were finding leptoquarks." Now the subquark has a +e/6 charge that appears to be rigidly attached to a color-charge mass of perhaps 25 MeV/c^{2} inside a nucleon, according to my model, so a lot of positrons could be scattered from especially since there are three of them. Actually, the reference to the existence of leptoquark pairs in the Standard Theory is mentioned in the next reference entitled "Hopes for Exotic New Particles Fade."[6] The HERA groups are scheduled to operate until October when the accelerator goes into a 2-plus-year remodeling program. Quoting their last statement, "The answer, when it finally comes, could be as mundane as minor tweaks in physicists' understanding of proton structure—or as electrifying as another new particle." How about three new particles, or nine counting color charge?

An even more cogent argument for nucleons being composed of component particles was published in the February 1996 issue of *Discover*[7] entitled "In the Nursery of Stars." First, I want to point out that the particle illustrated by the simple diagram in color on the cover page of this *Infinite Energy* might change into a proton-like particle with charge 2e, but it would quickly decay into a proton. The energy of the 6 particles involved approaches 4 MeV, so the formation of nucleons releases about 3 MeV energy. The discussion below supports the view that our primordial particles were such particles. The data comes from observations made by the new generation of telescopes, the Hubble Space Telescope in particular. Now I am quoting from a few statements in the article: "Infant stars are anything but quiet, they kick, they scream, they spew forth a thousand suns' worth of hot gas many light-years into space." Another quote, "Not only does gas fall inward, but vast quantities of gas and dust also stream outward, away from the nascent star. Narrow jets of gas apparent race from the stellar cradle at extremely high speed and stretch several light-years out into space." I believe I the answer to the following question is obvious, "Why do newly forming stars simultaneously take matter in and spew it out." The article also says, "Aside from the opacity of the dark clouds that provide the raw stellar material, the birth of a star creates quite a mess for astronomers to sort through." I shall summarize this 5-page article with one more quote: "Morse has concluded that the jets are 100 times denser than previous estimates. In other words, the jets actually spout the equivalent of one Jupiter's worth

of matter-into space every day." For the time being, I rest my case.

Notes:

1. Joseph L. McKibben, *Infinite Energy*, Vol. 1, No. 4, page 14 (1995). Errata—in Fig, 4 on page 17 the beautiful ^{35}Cl peak at 1083 gauss and the ^{37}Cl step at 1113 gauss were unfortunately not labeled. Also I want to retract my statement at the end of page 15 that there may not be enough + hemitrons for all the ions so some pseudoatoms naturally have charge +e/2. If that were true the automated type of oil-drop experiments would have picked them up but they did not.
2. Joseph L. McKibben, *Infinite Energy*, Vol. 2, No. 11, page 37 (1996/1997).
3. Klaus Lackner and George Zweig, *Phys. Rev.* D28, 1671 (1983).
4. Jagdish K.Tuli, National Nuclear Data Center, Brookhaven National Laboratory, Upton, New York 11973, U.S.A. (January 1985).
5. Gloria B. Lubkin, *Physics Today*, p.12, April 1997.
6. James Glanz, *Science*, Vol. 256, 1195 (23 May 1997).
7. Adam Frank, *Discover*, Vol. 17, No. 2, p.38-44, (February 1996).

Afterthought..... Comet Comment

In the most recent issue of *Science* (18 July, p.318) there is an article entitled "Comet Origin of Oceans All Wet?" Planetary scientists have surmised that the water on earth arrived via comets. [A recent proposal, not generally accepted, is that many miniature comets might be quietly showering our planet (Science, 30 May,p.1333) with water.] Observations indicated that the Hale-Bopp contains about three deuterium atoms for every 10,000 atoms of ordinary hydrogen. That's about twice the ratio in seawater. Observations on other comets are in agreement. Consequently, planetary scientists in general do not believe the earth's water came from comets of this type.

However, if the pseudo-oxygen nuclei are somehow getting broken up, the sub-quark-helium-nuclei ions could catalyze the formation of helium from these deuterium atoms and over a long period of time maybe the abundance has been lowered by the observed factor of two. Some oxygen atoms may have converted into copper too. There is no way these would have been detected—unless El Ninos are caused that way.

I can only speculate, and not very intelligently, on how the catalytic ions got free of their cocoon-like atoms. One method would be by cosmic rays from the Sun--Hale-Bopp would be exposed to those from space. A second method would be by photons from the sun striking the surface of the ocean. Lack of knowledge of the energy required makes it impossible to evaluate that possibility. And the third method is that the catalytic ions are released high up in the atmosphere where energetic photons are present but could these catalytic ions get the job done?

Joseph L. McKibben

Why not give
INFINITE ENERGY
as a **Gift**
Subscription
to a Friend or to your local library?

BlackLight Power, Inc. —Financial Developments

Infinite Energy profiled BlackLight Power, Inc, in issue #12. These financial facts on the company emerged from a story, by Maria Coole (Elizabeth Cummings contributed too), in a recent *Lancaster* (Pennsylvania) *Sunday News*:

"Stock Offering Powers Energy Co."

• BlackLight Power Inc. of Malvern, has filed its largest private stock offering to date with the Pennsylvania Securities Commission

• It has received a million-dollar investment from PacifiCorp Holdings, Inc., a public utility holding company from Oregon.

• A New Jersey utility company is negotiating for investment in Blacklight

• The nearly $5 million offering filed by BlackLight has been cleared by the Securities Commission.

• Tests are being conducted by a graduate student working on his master's thesis in engineering at Rowan University in Glassboro, N.J., and an employee of Atlantic Electric..."Jansson is reproducing Mills' experiments' and those of Jonathan Phillips at Penn State. **Jansson's tests are showing that Mills' process is producing 100 to 1,000 times more heat than would be produced if the same amount of hydrogen was burned."**

• Jansson is also involved in a full review of BlackLight Power for Atlantic Electric of Pleasantville, N.J., for possible investment.

• Mills said last August that he hoped in two years to take his company public. The company has issued shares of common stock several times privately since 1991, when 100,000 shares were issued for $75,000.

• Mills previously said he had 65 shareholders, 10 from Lancaster.

• Officers and directors of BlackLight Power, as listed in the memorandum filed with the Securities Commission, with a local connection include:

—Dr. Randell L. Mills, president and chairman of the board.
—Frank A. Orban III, vice president and secretary. Orban serves as associate counsel of Armstrong World Industries Inc.
—Paul Thibault, treasurer. Thibault, a Lancaster County commissioner, has been treasurer since 1992.
—Dr. John Farrell, professor of chemistry at Franklin & Marshall College, worked with Mills on his theory and is an investor,
but is not on the board of BlackLight Power.

• In the fall of 1992 and the spring of 1993, 1,200 additional shares were sold privately for $720,000, according to the offering memorandum filed with the Securities Commission. A 1994-95 private offering consisted of 869 shares of common stock for $1,303,500. An additional 900 shares of common stock was sold to existing shareholders from April to June of 1996 for $900,000.

• In September of 1996, the company sold $1 million of common stock to PacifiCorp Holdings, Inc., according to the memo, and a second direct investment is being negotiated with PacifiCorp.

• The latest offering is for $4,950,000 for 3,300 shares of common stock. at $1,500 per share. The stock is being offered in units of $30,000, consisting of 20 shares per unit.

• In addition, the memo states that an East Coast utility recently presented BlackLight Power with a proposal to invest $2 million.

• A spokeswoman for PacifiCorp, based in Portland, Ore., said she knew the company had a small investment in BlackLight Power.

• Mills traveled to Korea in February with Shelby Brewer, the former assistant secretary of energy under the Reagan administration, and he said they talked with Korea Electric Power Corp., Daewoo and Hyundai Motor Co. about licensing his energy process.

• Brewer, a consultant to BlackLight Power, will be going back to Korea to continue discussions.

New Energy Times Archive

NEUTRINO POWER

by Graham Toquer

When Fleischmann and Pons first unveiled their cold fusion apparatus, it seemed that the golden age was upon us. One little bar of metal, a coil of platinum wire, a test tube full of a metal salt solution, and we have fusion power, unlimited and almost free. But their results proved to be for the most part irreproducible—at least that was the common impression at the time (1989).

However, some funny things happened when others tried to duplicate the experiment. There were some confirmations along with many denials. A lot of people got minute quantities of energy, occasionally. A few people got levels of energy to rival Fleischmann and Pons, rarely. But wherever the energy is coming from, it does not appear to be the fusion of hydrogen nuclei as we understand it.

My theory is that Fleischmann and Pons have stumbled on a method to tap energy from neutrinos. And I think that we are on the trail of an energy source that can serve mankind's needs for the rest of human history: clean, safe, unlimited power for everyone, forever, for free.

I: The Neutrino - A Very Brief Overview:

TABLE 1.

CHARACTERISTICS OF PARTICLES INVOLVED			
	SPIN	CHARGE	LEPTON NO.
NEUTRON	±1/2	0	0
PROTON	±1/2	+1	0
ELECTRON	±1/2	-1	+1
POSITRON	±1/2	+1	-1
NEUTRINO	±1/2	0	+1
ANTI-NEUTRINO	±1/2	0	-1

Protons and neutrons can break down, or transform from one to the other. When hydrogen nuclei fuse, protons absorb electrons and emit neutrinos to become neutrons. Free neutrons emit electrons and anti-neutrinos to become protons. If an anti-neutrino strikes a proton, the proton can emit a positron and a neutrino to become a neutron. If a neutrino strikes a neutron, the neutron can emit an electron and an anti-neutrino to become a proton. (Neutrinos and anti-neutrinos differ only in lepton number and are commonly referred to together as "neutrinos.")

When such reactions occur, energy, spin, and lepton number must be conserved. This means that the sum totals of the masses, spins, and lepton numbers of all particles after the breakdown must be the same as the sum totals of the masses, spins, and lepton numbers of the original particles (See Table 1.) The neutrino conserves all three.

When a proton emits a positron, or a neutron an electron, there would be a discrepancy in the sum of their spins and lepton numbers without the neutrino. The neutrino or anti-neutrino which is emitted will have a spin such that the sum of all three spins is +1/2, and spin number is conserved. It will also have a lepton number that makes the sum total lepton number zero, as with the original particle.

In most cases, the proton and electron or neutron and positron do not depart from each other in a straight line, as two particles splitting from one another would be expected to do. They fly off at an angle, with slightly less total mass than one would expect from the mass of the original particle. The velocity of the neutrino makes up the difference, and conserves momentum.

> *I think that we are on the trail of an energy source that can serve mankind's needs for the rest of human history: clean, safe, unlimited power for everyone, forever, for free.*

Some evidence is turning up to suggest that the electron neutrino at least may be tachyonic[1]— traveling *only* at speeds greater than light. For our immediate purpose It doesn't need to be tachyonic. But I hope it is for all the great FTL gadgets that we could use it for.

II: THE TOQUER EFFECT

For reasons given in more detail below, it seems certain that the energy Fleischmann and Pons have obtained is not nuclear fusion as we know it. Therefore, the experiment is getting energy from a source not immediately evident. *Since all the cold fusioneers are looking for it, it has to be something hard to detect.* Neutrinos: 1) have energy; and, 2) are hard to detect. That's what got me working in this direction. The more I researched it, the more evidence and theoretical groundwork appeared to support my theory.

However, if the energy in question is not fusion, it also can not be proton/neutron and neutron/proton conversions as we know them. The neutron conversion causes emission of gamma radiation. This is evidence of fusion that scientists have diligently watched for, but failed to detect. It's also deadly, and I have not heard of any cold fusion scientists dying of radiation poisoning. So, if the energy is coming from neutrinos, it is being obtained by some other means.

Fleischmann and Pons took a rod of palladium and infused hydrogen atoms into it by electrolysis. They happened to be using deuterium, but that does not seem to be relevant (see below.) What I think they have done is to create an environment where hydrogen electrons cannot function in their natural fashion.

I am not the first to suggest this. One actively pursued theory has it that hydrogen passing through the palladium gets so crowded that its electron shell collapses to a previously unsuspected lower level and yields photons [Ed. Note: This is the theory of Dr. Randell Mills of Blacklight Power Corp..]. A lot of chemists like the idea, but physicists do not. Perhaps my theory will be more to their liking: *I believe that the electron shell is being squeezed into a higher dimension.*

Some of the latest theories about the evolution of the universe call for eleven to sixteen dimensions at the time of the Big Bang. The three spatial dimensions—plus one dimension of time — that we now use are all that remains of a greater universe. At one time, all the dimensions were open, and all the atomic forces were unified.

Then, as the universe cooled, the four lower dimensions drew apart from the rest. The remaining spatial dimensions collapsed to infinitesimal size shortly after the Big Bang. Particles that once existed in stable form, such as the muon and tauon, were no longer able to exist because the energy level of the universe was too low. Now they exist only as infinitesimally short-lived virtual particles, and brief tracks in cloud chambers.

It is my belief that the neutrino did not descend fully into three dimensional space/time with the other remaining particles. The neutrino is so small — perhaps dimensionless — that it can fit into the tiny amount of remaining space in a higher dimension. That would explain why it is so hard to detect, and almost impossible to stop. But there are incredible numbers of them, with energy. If only they could be

Alternative Energy

accessed. . . The Fleischmann and Pons experiment appears to do exactly that, and I can see one of two ways in which it could happen:

All particles behave both as particles and waves. In photons, this split personality is so profound that two separate experiments can prove that photons are particles and waves, respectively, without disproving one another. Next to photons, electrons are the next most wave-like of the particles. Their "orbit" around a nucleus is a fixed multiple of their "matter wave length." The wavelength of photons they can emit is also a function of this orbit. (Hence the "hydrogen emission" wavelength, 21 centimeters. More about that later.)

So when a hydrogen atom gets so compressed that it's sole electron cannot orbit its nucleus in a precise multiple of its wavelength, something has to give. I believe that the electron slides some portion of its matter wave length into N-Space

Alternatively, this wave can also be thought of as a "probability wave." Heisenberg's uncertainty principal states that the position of a particle in space and time can never be precisely determined. The more certain you are of its position, the less certain you are of its velocity or direction. The matter wave of the electron is the set of all points at which the electron might be found.

Sometimes this uncertainty is so great that an electron will pop across to the other side of an impenetrable barrier, or even escape from the event horizon of a black hole. This phenomenon is called "quantum tunneling."

When a shell electron is compressed by other shell electrons, it is constantly exchanging photons with them, the carrier particle of the electromagnetic force. Each exchange of photons reduces the set of possible points at which the electron can be, because it must be somewhere where it can interact with that other electron. When the electron is under constant bombardment it loses all its uncertainty in normal space/time. And then, it's position relative to N-Space becomes uncertain, and it can briefly quantum tunnel into N-Space. While it is there, it can interact with neutrinos.

(Either way it works, this phenomenon is hereinafter the "Toquer Effect," which I hereby cede to the public domain.)

Conventional wisdom says that neutrinos do not respond to the electromagnetic interaction, meaning that they will not exchange photons with other particles. However, even if this holds true in N-Space, they can still collide with electrons directly. The energy of their velocity can be emitted by the electrons back in normal space.

I also believe that hydrogen atoms, whose electron shells are constricted ("Toquered") can relinquish energy to any neutrinos which strike them, if they are in a highly energized situation, such as the interior of a star. This brings us to:

III: THE SOLAR NEUTRINO PROBLEM:

For the past twenty years, a neutrino detector has been operating in a gold mine in South Dakota. It consists of a large tank of chlorine cleaning fluid. If a neutrino strikes a neutron, the neutron can emit an electron and become a proton. In an atom of chlorine 37, this will cause transmutation into argon 37, which is radioactive and readily detectible. Existence of the neutrino was demonstrated in this way in the 1960s.

...hydrogen atoms, whose electron shells are constricted ("Toquered") can relinquish energy to any neutrinos which strike them, if they are in a highly energized situation, such as the interior of a star.

For over twenty years, this detector has consistently reported one-third of the expected number of neutrinos. A Japanese detector of a different design reports the same results. The Toquer effect affords an explanation:

Fusion takes place in a small region at the boundary of the sun's helium core where the pressure is high enough. Four hydrogen atoms fuse to become one helium nucleus of two protons and two neutrons. When protons become neutrons, they release high energy neutrinos. These neutrinos speed past us every moment of our lives, unnoticed.

At the same time, further out in the sun's strata, is an immense layer of very dense, very hot hydrogen, under tremendous pressure. The electrons of individual hydrogen atoms are Toquered into N-Space. They stop high energy neutrinos from the sun's core, filtering out two thirds of them. The kinetic energy they receive is released into normal space as heat. However, because so many electrons are Toquered at any given moment, a lot of that energy can be lost back into N-Space.

The constant collisions of highly kinetic hydrogen atoms cause their electrons to constantly exchange photons, all with the same quanta of energy. When a hydrogen electron receives a photon from another hydrogen electron, it is exactly the right quantum for it to re-emit. If part of its orbit is Toquered into N-Space, it can deliver the energy to a neutrino. There will be lots of neutrinos close by at near rest, due to the filtering effect of the Toquered electrons. In many cases, a neutrino may strike an electron's matter wave, discharge a high energy quantum, and pick up a hydrogen emission quantum all in one reaction.

Like photons in normal space these energy transfers in N- Space occur in discrete quantum packets, identical to the amount of energy in hydrogen emission photons. But a neutrino detector that counts particle breakdowns will not detect these neutrinos. It only detects the more energetic neutrinos from proton/neutron conversions, and two thirds of them have been filtered out.

This is the energy that the cold fusion scientists have been collecting with their experiments. They compress hydrogen atoms, which interact with neutrinos energized with hydrogen emission quanta in N-Space, and bring the energy back into normal space.

Hopefully, all of N-Space is a boiling soup of high-energy neutrinos with the great majority having energy quanta equivalent to hydrogen emission photons. The temperature of N-Space should be the average temperature of the inner hydrogen shells of the stars, between the hottest point at which hydrogen can exist as atoms rather than plasma, and the outermost point at which the Toquer Effect can take place. Hotter stars should lose energy into N-Space. Cooler stars should gain energy from it. If we draw it down, every star in the universe should replace it. The energy can not be exhausted as long as the stars shine.

IV:COSMIC EVOLUTION AND THE TOQUER EFFECT

My theory gets some support from cosmology. Observations from the Hubble telescope are clarifying our view of the universe's development, and raising some questions.[3] Wendy Freeman at the Carnegie Observatory now puts the birth of the universe at not more than eight to twelve billion years ago. The trouble is that there are stars that appear older than that.

However, the loss of energy into N-Space, and its return from N-Space, is a fudge factor. Without it, any attempt to understand stellar life cycles is going to yield meaningless figures.

Some theories have it that the higher dimensions have energy left over from the collapse of the higher dimensions. If so, the energy in N-Space would have started

leaking out as soon as there were protostars large enough to bring about the Toquer Effect. This jump start would have started stellar evolution much earlier than anyone expected, heating up protostars until they began to fuse. Then, energy might have flowed in the other direction, back into N-Space.

Conversely, If N-Space was originally cold and empty, stars would have lost a lot of energy into it at first. They would have burned their fuel a lot faster to maintain equilibrium, and aged faster. Then, when the temperature of N-Space reached the average stellar hydrogen core temperature, the loss would have stopped. Stars that were running a little cooler than average could gain energy. Stars that ran hot could lose it, creating a leveling effect. (This energy drain may account for much of the lost mass of the Universe.)

Quite possibly, this moment of equilibrium was reached very abruptly through the universe. After all, N-Space is very small in volume by cosmic standards, and neutrinos may be tachyonic anyway. If so, suddenly every star in the cosmos was overfueled for its spectral class. How much so is a function of the rate at which a star can gain energy from or lose energy to N-Space.

The wildest possibility is that many of the stars in the universe exploded, popping off like firecrackers, in an incredibly short period of time by cosmic standards. The blasts would have resembled supernovas, although the processes are different. And that would have created the heavy elements that compose this planet we inhabit, as supernovas would have done. However, they would have done so much earlier in the life of the universe, before great numbers of supernovas would have evolved.

For the rest, normal stars would have expanded into giants, and dwarfs flared up into viable stars. It could have been the most abrupt cosmic event since the big bang. It might have wiped out every sapient race in the universe, if there were any in a mostly-hydrogen cosmos. It may have vaporized the gas giant planets of the era, which is why we are now seeing mostly nebular material surrounding other stars. It may even have left microwave echoes as the Big Bang is thought to have done.

V: THE COLD FUSION EXPERIMENTS

What information I have been able to obtain concerning the current state of affairs in cold fusion *[Ed. Note: And it was very limited information until this fine author began to receive Infinite Energy — after he had written this article!-EFM]* supports my theory. The last comprehensive follow-up I could find came out in *Popular Science* in August, 1993.[4] As of that time, there were a number of odd findings that had the researchers puzzled:

1. Several researchers discovered that they could get heat using only light water. This cannot be the protium-deuterium fusion Fleischmann and Pons envisioned, but it could be the Toquer effect, which does not require deuterium.

2. Fleischmann and Pons used a palladium electrode, and heavy water, doped with lithium deuteroxide for conductivity. But a Japanese researcher achieved results with light water using a nickel element, with potassium carbonate added to the electrolyte. Some experimenters got better results by adding silicon or aluminum salts to the electrolyte. There is no consistent logic to explain why all of these actions would facilitate cold fusion.

All these processes accomplished the same thing: They took a piece of metal, and infused smaller ions into it by electrolysis. Along with the hydrogen, there would have been lithium ions, or potassium, carbon, silicon, or aluminum as the case may be. While none of these dopants are consistent with fusion, all of them could be consistent with the Toquer Effect. In all cases, these ions along with hydrogen ions blocked up the pathways through which other hydrogen atoms could have traveled.

This is especially true since the nuclei came in as ions. On finding permanent resting places, they would have shared outer shell electrons with their nearest neighbors, making the path still more difficult. In all such cases, the incoming hydrogen atom's electron shell would have been squeezed, forcing it into N- Space.

3. Fusion products such as tritium and helium-four were detected — but in quantities that were "inexplicably low." Some experimenters reported finding traces of calcium when they used potassium in their electrolyte, thought to be the result of a potassium atom fusing with a hydrogen atom.

The "fusion products" are not formed in the way everyone expects. The Toquered electrons are stripping neutrinos of their energy, leaving them at rest, or nearly so, relative to the experiment. As a result, there are many more than usual neutron-proton and proton-neutron conversions in progress, because there are neutrinos at rest in a ready position to facilitate. The constricted state of the electron shells also means that the electrons will be readily crammed into the protons whenever the conversions take place. Free neutrons are being created from protium atoms, and free ions jostled against them by the current flow, causing neutron absorption. If an atom of deuterium were jammed up against an atom of protium, and that protium nucleus decided to absorb its electron and turn into a neutron, the deuterium atom could absorb it to become tritium. If one of the neutrons chose to convert back into a proton, helium would result. Absorption of another neutron yields helium four. (Or possibly, a lithium nucleus has a proton which turns into a neutron?) As for the potassium-calcium conversion, I suspect that one of the neutrons in the nucleus became a proton, and the nucleus acquired a free neutron for stability.

4. If Fleischmann and Pons had generated as much heat from fusion reactions as they claimed to have done, the radiation should have killed them.

Obviously, they didn't get killed. If the "higher dimension" hypothesis is correct, neutrino power produces no radiation, except possibly 21 centimeter electromagnetic radiation.

5. At the laboratory of Michael C. H. McKubre, SRI International, a sealed cell exploded and killed a worker. In "reproducible" experiments, there was a heat gain of 1 to 30 percent over the amount of energy that went in. But, at inexplicable intervals, there might be "heat bursts" of up to 300% gain that might last several hours. One experimenter got tremendous amounts of heat —very briefly— using a strip of palladium plated on one side with gold. He bombarded it with hydrogen and ran a current through it for several hours until it flared up.

I look upon these phenomena as feedback situations. That requires further explanation of my theories: I tried for some time to find an argument to support the idea that neutrinos retained the wavelength of the quanta they acquired, and perhaps they do. Then I realized that since photons <u>are</u> quanta, an energy packet carried by a neutrino from one hydrogen electron to another will automatically assume the correct wavelength on re-emission.

The significance of that is that Fleischmann and Pons's experiment gathers neutrinos of all "frequencies," much of which hydrogen electrons cannot re-emit. Much of the energy is released as heat. This severely limits the potential energy output, since heating the working element makes it easier for hydrogen to diffuse and cancels out the Toquer Effect.

If, instead, we concentrate on capturing only hydrogen emission quanta, the most common sort, the hydrogen electrons can re-emit them as photons rather than simply

New Energy Times Archive

distributing the energy as heat. Electromagnetic radiation on the 21 centimeter wavelength is what we would call radio waves, and they will not heat the working element much. Better still, they can be converted into electricity by a simple antenna grid.

Now, getting back to the matter of feedback: With time, statistical chance may create a situation where enough hydrogen atoms are Toquering hydrogen emission quanta in unison to generate an EMR (electromagnetic radiation) signal, which causes more atoms to resonate in harmony, and increase the signal strength. This will also cause a "heat burst," since not all the quanta will be 21 centimeter equivalent. The heat stops when enough hydrogen boils off to stop the Toquer effect, or the metal heats and expands enough for free passage of hydrogen ions.

In the case of the explosion, I suspect that the working element managed to generate a weak 21 centimeter signal, which reflected off of some nearby metal surface, and re-excited the working element, causing the emission of another, stronger wave. This would have resulted in very rapid positive feedback until the working element vaporized and blew up.

VI: SUGGESTIONS

To make the Fleischmann/Pons experiment work better, I suggest the following changes:

First, recognize that the point is to compress hydrogen electron orbits, not to fuse hydrogen. Deuterium is not needed. If I had gotten around to building a prototype (and I may yet,) I was going to infuse metal ions of several sizes into my working element to close up all possible gaps.

Start with say, potassium, then sodium, then beryllium, then boron, and then lithium, each atom smaller than the one before. Hydrogen would have to be constantly supplied. Otherwise, it will just diffuse out again. I was going to try to infuse it by making the electrical current jump a gap to the working element in a very diffuse hydrogen atmosphere, but this might interfere with the incoming EMR signal, unless only the two ends were in hydrogen. Alternatively, I might try a hollow working element with hydrogen on the inside.

However, with all their experience in semiconductors, the boys at Intel or Motorola can probably dope up a piece of silicon with exactly the right electrical properties, and save a lot of needless legwork. The production version will be a solid block of silicon, with working element, control circuitry, signal generator, etc., all built in as integrated circuitry. It ought to be possible to manufacture N-Taps for twenty bucks apiece.

My other suggestion is to substitute alternating current for direct current, on the frequency that corresponds to 21 centimeters. The idea is to make all the electrons deliver their photons in unison, so that we get radio frequency energy instead of mere heat. If that doesn't work, the working element can be stimulated with a radio wave or an oscillating magnetic field on the appropriate frequency.

....with all their experience in semiconductors, the boys at Intel or Motorola can probably dope up a piece of silicon with exactly the right electrical properties, and save a lot of needless legwork.

Since the energy is coming out on the hydrogen emission frequency, we need a 21 centimeter antenna to properly radiate it, hence a 21 centimeter working element. Using a current equivalent to 21 centimeters gets us the maximum possible number of oscillations for the wavelength. The EMR can be caught by an external antenna grid and converted directly to electricity. The grid may also reflect some back and make the working element self-exciting, but remember the experiment that exploded. For control purposes it would be better to use a signal generator and eliminate all possibility of feedback.

If such a power source as I have described is possible, it might also explain why the folks at the Arecibo radio-telescope can't hear any "little green men" out there. What they are listening for is either a deliberate message, or accidental noise. Advanced races with tachyon technology — if the neutrino is tachyonic— are not going to waste time trying to get us on the EMR radio. They'll wait until we develop tachyon radios of our own.

As for accidental emissions, I don't think there will be any. We emit a howl of electromagnetic noise, because our technology is sloppy. A high tension line is an antenna transmitting a sixty-cycle roar for all to hear. The output is so intense that it will light a florescent light tube hundreds of meters away.

But if you change over to individual power sources for every application, such an energy loss constitutes waste and possible hazard. A properly designed N-Tap will put out as little EMR emission as possible, perhaps none at all, and certainly nothing detectible from another star.

One thing that would be really nice would be to be able to interact with neutrinos in N-Space coming from one direction only. If we could catch them and reflect them back the way they came, we would have a "neutrino sail," which would provide unidirectional propulsion. Failing at that, perhaps we could obtain energy from N- Space, and use it to generate new neutrinos and shoot them off in only one direction, a "neutrino rocket." Either way, you get free thrust, with no exhaust. This kind of space drive can put an air car — if not a space car — in every garage, a personal flying belt on every back, and send starships anywhere you can reach in the lifetime of the universe.

Given a Joe Haldeman-style acceleration tank, you can reach relativistic speeds in a few days, and make a trip anywhere you want to go in a few weeks subjective time. And if you happen to pass by a galactic-size black hole, you may be able to shortcut through time and return to your destination, effectively beating the speed of light. (Hey, you guys at Groom Lake. If you do happen to have any crashed UFOs kicking around, check and see if the drive unit is anything like I described, OK? Thanks!)

Also, if you mount a neutrino thruster on a flywheel, you have a neutrino motor, a perpetual motion machine that will do mechanical work for free, forever.

VIII: SPECULATIONS

1: Aside from the practical considerations relating to the possibility of a new energy source, the most significant thing about the Toquer effect is that it allows for access to higher dimensions, something current theories did not guarantee. And this raises possibilities that can greatly simplify particle physics as we know it.

There is great symmetry between the electron, the muon, and the tauon. Aside from being much more massive and decaying quickly, the two heavier particles seem identical to the electron, and break down into the electron. (The muon mass is 207 times the mass of the electron, the tauon 3,500 times the electron mass.)

The carrier of the strong nuclear force, the plus or minus pion, breaks down into a muon and a muon-neutrino. The carrier of the weak force, the plus or minus W particle, breaks down into a tauon and a tauon-neutrino. There is also a neutral pion for the strong force, and a Z particle for the weak force. Both act like photons and break down into photons.

For each of these particle sets there is a corresponding "flavor" of quarks. Muons correspond to Middle quarks, and tauons to Top quarks. The quarks are bound together by gluons, which are also similar to photons, except that they have the quark characteristic of color.

New Energy Times Archive

Physicists have wondered out loud why such duplication exists, while trying to unify the forces these particles manifest. Given the Toquer effect, it is possible that there is no duplication: the electron, the muon and the tauon are the same particle, and moderate the same force, give or take a few dimensions.

Imagine that we are Flatlanders. We observe a particle moving straight away from us and clock its velocity. Being Flatlanders, we do not know that the up/down dimension exists. We think the particle is receding straight away from us.

In fact, however, our two-dimensional space is curved, and the particle's actual course is a vector from our flat perspective. The faster it goes the more it curves away from our two-dimensional space. When we measure its velocity, we are seeing only the horizontal component of the vector, V1. Relative to itself, the particle never drops below velocity V. But if the vector is forty-five degrees, the particle will appear to travel at 1/2 V. If we try to accelerate it further, we find it progressively more difficult because the two vectors are working against one another.

The particle impacts a target and we determine its mass. In making the calculation, we use the apparent velocity V1. This has the effect of making the apparent mass of the particle come out to a much higher figure. How else could such a slow-moving particle yield so much energy? (This whole exercise, if you hadn't noticed, is simply a Flatland version of general relativity.)

If the particle has two extra dimensions, and is in motion in both of them, still less of its true velocity will be apparent, and it will appear to have a still higher mass, because it takes still more energy to make it attain that unseen velocity. To attain the next higher dimension, a particle has to exceed velocity W in its current highest dimension, where W is the speed at which the curvature of space will cause the particle to vector into the next higher dimension. This adds more unseen energy. Each added dimension is an exponential increase in apparent mass. ("Higher" means, having a higher energy level. Spatially, each "higher" dimension is 90 degrees from the previous one.

In 3-D space/time, a particle vectors in time rather than space because space is curved in time. It also seems to shrink in size, because it is removed in both space and time (the Fitzgerald contraction.) Also, the more time the particle uses as additional space, the less it can use as time. Hence, time passes more slowly for the particle than for us, the well-known time dilation. But suppose we wish a particle to vector in the other direction, to a dimension 90 degrees away from our three dimensions, and from time as well?

The Flatlanders fire one particle at another at as near to their C as they can manage. The moving particle is traveling above their flat universe, but their space curves upward to meet it, and they perceive it to be still entirely within Flatlander space (just as we fail to perceive that a moving object in our universe is vectored in time). When it strikes the target particle, there are two components to its motion, V1 and V2.

The horizontal component, V1, accelerates the target particle forward, a classic Newtonian reaction. And V2, the vertical component — the potential energy of the moving particle's distance above the two dimensional universe — slams downward on the target particle as the moving particle loses the velocity that keeps it in that higher dimension. This too has an opposite reaction, accelerating the target particle "down" into another dimension the Flatlanders had not suspected.

Now we apply this logic to 3D space/time. A three-dimensional particle traveling near C has a vector in time. When it slams into a target particle, its proper motion propels that particle forward. But its vector in time should accelerate the target particle in the equal and opposite direction, 180 degrees away from time, but still 90 degrees away from the three spatial dimensions.

The higher dimensions are thought to be minute in extent. Once accelerated into N-Space, a particle does not have the cushioning buffer of time to prevent it from jumping dimensions. As soon as it is moving fast enough for the curvature of space to cause it, it will vector into the next dimension, and the next. if its velocity is W or greater.

W may or may not be equal to C in the higher dimensions. Since time is not a factor, particles might be able to exceed C in these higher dimensions. But then again, the curvature of space may cause them to slide into the next dimension before they reach C. Each time a particle enters a higher dimensions than before, more of its motion takes place out of sight of the flatland observers, and its apparent mass increases exponentially.

Once vectored into one or more higher dimensions, an electron will appear to be slower moving and more massive, until it returns to its normal state. Because the energy needed to reach the next higher dimension is so large, particles with differing numbers of dimensions will be exponentially different in mass, velocity, and lifespan (due to time dilation).

I suggest then that a muon is nothing more or less than an electron or positron Toquered into a higher dimension, or perhaps more than one higher dimension. Combined with a Toquered neutrino, it's a plus or minus pion. And the neutral pion? Simply a Toquered photon. The tauon and its derivatives are the same story, taken one or more dimensions higher.

The forces they moderate become narrower in focus and more powerful as you move into higher dimensions. Otherwise, the principles are similar. A field is a probability field of all possible points at which a virtual particle might pop into existence, and then pop out before the universe notices the violation of the law of conservation of energy. The particle is a manifestation of the field, not the reverse. And at any given instance, the field causes to appear whatever virtual particle suits the purpose, with however many dimensions are needed for the purpose at hand.

This symmetry raises one question: Why is there no exchange particle consisting of an electron and a neutrino pasted together, with a charge of plus or minus one, and integral spin?

Well, there was, back in the early moments of the universe. Before the dimensions separated, there was only one nuclear force and one exchange particle, as just described. As things cooled down and the dimensions separated from one another, the three nuclear forces separated. And the neutrino declined to descend into 3-D space, but remained in N-Space, where it can no longer combine with un-Toquered electrons. So now electrons and neutrinos have to work separately. To the extent that this particle still exists - and it may — I tentatively name it the **Phion**, or perhaps the **Integron**. More about that later.

The above reasoning seems to continue to hold when we look at quarks. Middle and Upper flavor quarks are identical to lower flavor quarks in every respect except mass, and they decay into lower flavor quarks. Their existence was first deduced when muons and tauons were detected. The reasoning was that muons and tauons were separate leptons, and must have corresponding quarks. Since my theory considers muons and tauons to be Toquered electrons, there is no need for such quarks, or their gluons. To the extent that they have been observed, they are simply bottom quarks Toquered into higher dimensions along with the particles they came from.

Gluons resemble photons, but have the added characteristic of color charge. Color describes the ability of two up quarks to exist in one particle. Conventional theory says that two particles cannot occupy the same quantum state, so they added the quality of "color" to distinguish the two quarks.

Color was a characteristic that existed earlier in the life of the universe, but now is only found inside closed nuclei where the three colors — red, blue and green — add up to white. Therefore, a gluon can be a photon occupying a still higher dimension, corresponding to the energy level of the universe when color existed.

Now let's go the other way for a moment. Take a photon, and take away one dimension. In this case, we will remove the dimension of time. As the photon gained dimensions, it's range of action decreased, its mass increased, and the time it took to

New Energy Times Archive

work increased. Therefore a photon with will have a much greater range of action much more quickly. In fact, since there is no time for it to travel, its speed must be instantaneous. That sounds suspiciously like a graviton. The latest fad in particle physics - string theory - holds that gravitons are two- dimensional loops of string existing in ten dimensions and traveling instantaneously. The loops are capable of merging together or breaking apart as needed.

If you raise a graviton into 3D Space/Time, it becomes slower, more massive, and narrower of scope, a photon. A virtual photon — one that pops up to moderate the electromagnetic force and disappears again — is part of the graviton loop holding that particular atom together. But a real photon, one that carries energy from point to point, is a loop of gravity string that has broken loose on its own. We perceive it as a particle because only a small segment of it shows in our dimensions.

It would appear then that a photon is a graviton raised one dimension and wrapped around a quantum of energy. The symmetry we are looking for suggests that. Could a neutrino be a graviton raised into N-space, and wrapped around a unit of spin? I bring it up because gravitons, photons and neutrinos seem to be the only particles not made out of quarks. Also, both energy and spin are exchanged during weak-force reactions. If gravitons carry units of energy between charged particles, why could they not carry units of spin? It would explain why electrons and neutrinos seem so willing to interact in N-space, the original manifestation of the Toquer effect. And it would tie up one more loose end.

Three scientists at Brookhaven appeared to have proven that muon neutrinos and electron neutrinos were not the same particle by firing muon neutrinos at a target. The kind of neutron/proton reactions you would get with electron neutrinos did not take place. However, by my theories neutrinos do not exist in 3-D Space, but in the next higher dimension. If the neutrinos were emitted into a still higher dimension, they may have missed the target like a tennis ball flying over a net.

This leaves us with a universe of six elemental particles and their anti-particles, one force carrier, one force, perhaps one neutrino, and a particle called a Higgs Boson which is thought to convey mass. Come to think of it, they invented that one to try to explain the mass discrepancies of electrons, muons, and tauons. Maybe we don't need it any more. The particle zoo has now become immensely simpler. The scientists trying to achieve a real unification theory can wrap some numbers around this thought experiment and determine whether there is really anything to it.

2: In a superconductor chilled to almost zero degrees Kelvin, there is almost no molecular motion. This means that there is very little uncertainty in space or time for electrons passing through. This is an ideal situation for the Toquer effect. I suspect that electrons join with neutrinos to become Phions (or Integrons, as you prefer), and this is why they superconduct. Electrons have a spin of plus or minus one half. Combined with a neutrino, they would have a spin of one, like the pion and W particle. With integral spin, there is no chaotic scattering of particles when they push against one another to cause resistance. And if they encounter obstacles, they quantum-tunnel around them through N-Space.

It would just be too sweet if a unified field theory came out of the Cold Fusion effort, with some earth-shaking new technologies to go with it.

This is the first theory of superconductivity that I recall hearing about. It should simplify the task of designing new superconductors now that we know what we are trying to do: minimize molecular motion and uncertainty of position. A good superconductor will be highly structured, with every atom bonded to as many other atoms as possible, and as little space between molecules and crystals as possible. In fact, a good superconductor and a good working element for a neutrino tap sound like much the same thing. I would be interested to dunk such a working element in liquid nitrogen and see if it repels magnetic fields.

These are all just idle speculations that follow up on my original observation. I am not mathematician enough to wrap equations around this thought experiment, but there are plenty of physicists out there who are. Perhaps a few are cold fusioneers. If so, do give it a shot.

It would serve the physics community as a whole right if my theories are correct. As before, I cede all of the foregoing to the public domain.

According to Arthur C. Clarke in an interview in *Discover* magazine, the Russians have seven thousand "cold fusion" units in operation *[Ed. Note: Clarke was referring to the Yusmar (Potapov) cavitation heating devices, of still unknown performance.—EFM]* And the scientific establishment is still yawning and crying "humbug." Any competent physicist could have made the deductions I have made, and done it a long time ago at that, eliminating years of development time. But instead they put on their high hats, sneered "not invented here," and let the greatest opportunity in human history simmer on the back burner for years. It would just be too sweet if a unified field theory came out of the Cold Fusion effort, with some earth-shaking new technologies to go with it.

IX: AFTERWORD

An energy source like this has obvious military applications. Not only for transport, but for guided missiles that accelerate at 100-G all the way to their target. For lasers, masers, and directed energy weapons of all kinds. For electromagnetic accelerator guns. For a lot of other crap that doesn't put beans on the table.

Folks, let's not get into that. We are living in an era where peace is breaking out all over in spite of the best efforts of some of the so-called leaders on this planet. Treaties are being signed right and left. Let's not blow it.

L. Sprague DeCamp wrote a chilling yarn called "Judgment Day," about a scientist who was debating whether or not to destroy the world. After listing his lifetime of grievances, he ended "I will destroy the world. I will publish my report." That one's been on my mind of late.

But I am also reminded of Ted Sturgeon, and a story called "Brownshoes," about a hippie who invented a perpetual motion machine, and had to "turn establishment" to get it accepted.

Best of all, though, was Sturgeon again with: "It Was Nothing — Really!", about a man who tore a sheet of toilet paper, and saw it tear unevenly. Hypothesis: The perforated section is stronger than the rest of the sheet. Remove more material, and it becomes stronger still. Continue ad infinitum, and you get an indestructible substance made of nothing at all.

The story was hilarious, but the moral was dead on: Great discoveries come from small observations. "So when it happens, don't just say Damn and forget it. Stop a minute and think it through. Someone is going to change the face of the Earth, and it could be you."

BIBLIOGRAPHY

1. "Neutrino Physics: Curiouser and Curiouser," by John G. Cramer. *ANALOG Science Fiction Science Fact*, September, 1992. Page 139.

2. *Hyperspace,* by Michio Kaku, Oxford University Press, 1994.

3. "Oh, So Young," *Discover* Magazine, January, 1995, p35.

4. "Cold Fusion" by Jerry E. Bishop, *Popular Science* Magazine, August, 1993, pp. 47-51, p. 82.

Non-Profit Times Archive

Work In Constant Entropy Systems

Remi Cornwall BEng MSc
The Friends of John Galt (FJG) Ltd
152 Grierson Road, Forest Hill, London SE23 1NX
r.o.cornwall@city. act uk

Abstract

This paper aims to show that heat is not a dead end of energy transformation and that macroscopic perpetual motion could be possible by the Maxwell Demon-like sorting process in constant entropy cycles and phase changes. A realistic device utilising first order phase changes that could show this effect is then discussed. Heat re-use is the key to perpetual motion and this is shown possible by theorems developed herein that state: thermal particles of a working substance in a closed cycle can sort themselves at constant temperature by microscopic work (via theorem 1) and that macroscopic work can be liberated by a change of phase of the working substance (theorem 2). Key to development of the paper is the irrefutable *spontaneous temperature rise and density changes* on first order phase transitions which obey the 1st and 2nd Thermodynamic Laws, and again so when the a phase changing catalyst is made and inserted into a closed, isolated system.

The argument having proceeded along plausible lines (both theoretical and practical), then seeks to show that: if energy can leave the closed systems in question, then the Second Law is broken because there would be a spontaneous decrease in entropy by natural sorting processes. An interpretation of Entropy as merely the heat dissipated by dissipative (chemical and temperature gradient as opposed to conservative) potentials follows. The Principle of Potential Decrease is developed for the direction of 'Time's Arrow' which encapsulates the Second Law. This approach is linked in with chaotic dynamics of the three or more body problem and shows that time still has a direction, even at dynamic equilibrium; direction arises even though the underlying equations of motion are time invariant. The problem of the sense of time and memory is tackled, in a constant entropy system, with the said principle and the thermodynamic cycle discussed to show the 'onewayedness' of influence (causality) and hence sense of time. The 'Teacup Paradox' is discussed and shows how that although, in principal, all the energy used to make the cup can be recouped once smashed by the thermodynamic cycle discussed, the *information* regarding the configuration of its atoms is always lost.

Introduction

This paper is the result of investigations into a device, originally intended as a wet scrubber for car exhausts, that employs hygroscopic liquids and semi-permeable membranes. The idea of a general purpose device for condensing water vapour arose and a thermodynamic analysis was necessary to provide a figure-of-merit for comparison with other desalination systems.

The analysis soon revealed that the device could operate without energy input or even generate energy, this apparently coming from the heat energy of the input water reservoir. It was then time to really think what was going on and get to the essence of the paradox. Serendipity or maybe fate led me, in one of my browsing moments around the library thermodynamics shelf, to a book (9) on "Maxwell's Demon." Here then, presented in this paper, are my thoughts on: constant entropy cycles with phase changes, the correct interpretation of entropy, an encapsulating principle for the second law, and the direction of time.

The paper is mainly a qualitative account Largely to appeal to engineers (my background) and because some of the strong hunches (backed up by experimental observation) need the rigour of analysis or re-presentation of someone else's source analysis in a style relevant to the material in this paper. The full proofs of (see later) the Phase Change Theory (Theorem 2) and re-presentation of the "non repeating trajectories in state space" ideas of multi-body dynamics to concur with information loss, need further development and shall be submitted in paper or probably letter form to the journal later.

The paper is presented in the following sections:

- **Work Done at Constant Entropy/Temperature in a Closed Isolated System**
  - **Dynamic Equilibrium: A Gas in a Gravity Field, Phase Equilibrium.**
  - **Fluctuations in a Body of Material: *Theorem and Corollary.***
  - **First Order Phase Transitions Characterised.**
  - **A Spontaneous First Order Phase Changing Catalyst.**
  - **The Phase Changing Catalyst Inserted into a Closed Isolated Environment - Paradox.**
  - **A Realistic Device and its Applications.**
- **Maxwell's Demon.**
  - **Why Earlier Schemes Have Failed.**
  - **A Third Type of Demon:**
  - **Microscopic Work can Sort.**
  - **The Need for Phase Changes in Order to do Macroscopic Work. *Theorem***
  - **Why Resistive Electrical Thermal Noise Cannot do Work and *Principle of Limit to Intrinsic Energy Dissipation by Heat Pump Devices.***
  - **Summary of Phenomena that are likely Candidates.**
- **The Correct Interpretation of Entropy as 'Dissipated' Energy and Time's True Arrow.**
  - **Spontaneous Heat Pumps, Entropy decrease and Heat Recycling.**
  - ***Principle of Potential Decrease.***
  - **Boltzmann relation is the mechanism of heat flow.**
  - **Least Action Principle in Other Fields.**
  - **Thermodynamics is Multi-bodied Dynamics.**
  - **Chaotic Trajectories in state space.**
  - **Dynamic Equilibrium, The 'Teacup Paradox' and Loss of Information**
  - **Causality and Memory, why we remember the past.**
  - **Time's Arrow is:- Potential Decrease and Information Loss.**
- **Last thoughts and summary. .**
- **References.**

Doing Work at Constant Entropy/Temperature in a Closed Isolated System

The order of presentation of this section is not how I came to the paradox presented later in this section, but the overview I saw after some thought. I initially took as *irrefutable* the operation of the phase changing catalyst and proceeded from there to the constant entropy cycle and consideration of microscopic work at dynamic equilibrium and the similarity to the constant entropy cycle.

This section is meant to whet the appetite for the next section by building confidence in the reader that a first order phase changing system could work. The next section (Maxwell's Demon) then seeks to generalise the constant entropy cycle to phase changes in general and add insight at the microscopic level.

In this section, spontaneous first order phase change is discussed - temperature rise and change in density. This I consider so well known and the analysis so simple and I use it to build my argument. Refutation of the shocking conclusion would conclude that this simple well known physical phenomenon cannot occur - there is no other way. If perpetual motion scares you and you cannot provide strong counter arguments, then you are wasting your time reading this paper.

New Energy Times Archive

Dynamic Equilibrium: A Gas in a Gravity Field, Phase Equilibrium

Consider a gas in a gravity field in a closed isolated universe at equilibrium. A strange way of looking at this equilibrium case is to consider that gas molecules with a vertically upwards component to their motion are doing work against gravity and that ones with a component vertically downwards are doing work on the gas system. The two work terms obviously cancel because the gas does not heat up — no net energy has been supplied to the system. This concurs with the viewpoint of heat being microscopic perpetual motion of atoms and molecules. This work is not obtainable macroscopically because a device would experience no net effect due to macroscopic cancelling of the microscopic terms.

Another dynamic equilibrium scenario is phase equilibrium between say a vapour and liquid phase. A second law description of this 'inactivity' says that $\Delta S = 0$, as concurs with:

$$d\Delta S_{total}/dt = d\Delta S_{evapouration}/dt + d\Delta S_{condensation}/dt$$

$$\Rightarrow dM_{evapouration}/dt.L / T - dM_{condensation}/dt.L / T = 0$$

This occurs at constant temperature and since there is no net flow of matter, $dM_{evaporation}/dt = dM_{condensation}/dt$. However, even if there is no macroscopic work being done, one has to admit that there is microscopic work being done in these constant entropy cycles — if one looks away from the orthodox viewpoint. The next section merely quantifies the effect and shows that work is being done at constant entropy and this doesn't violate the 1st law either.

Fluctuations in a Body of Material

This subsection seeks to show how this picture fits in with orthodox thermodynamic thinking, showing that work is possible at constant temperature just by statistical fluctuation of the particles making the system alone.

Reference 1 models a small system in contact with a large reservoir and the fluctuation in its thermodynamic parameters. The path is via the Boltzmann relationship:

$$S = k.\ln P + S_0 \text{ or } P = P_0\, e^{DS/k}$$

where, S is entropy, k is Boltzmann's constant. P and P_0 are probabilities, the latter just being a constant of proportionality.

An appropriate thermodynamic potential +is used (Gibbs function) and substituted for S since the analysis is done at constant pressure and temperature. Leading to

$$P = P_0 e^{-DG_0/kT}$$

The expression for ΔG_0 is expanded to second order about T_0 and P_0 (the reservoir's thermodynamic co-ordinates) in terms of ΔT and ΔV leading to:

$$P = P_0 e^{-((C_v/T_0)\Delta T^2 + (1/\kappa V)\Delta V^2)/2kT_0}$$

The point being that the above expression shows that the system is subject to random fluctuation by two uncorrelated Gaussian distributions in ΔT and ΔV. This agrees with our intuitive understanding of kinetic theory and how all macroscopic thermodynamic measurements are averages of molecular events.

The standard deviations < > of the two distributions show that:

$$\langle \Delta T^2 \rangle / T_0^2 = \kappa / C_V$$

and

$$\langle \Delta T^2 \rangle / V^2 = \kappa kT/V$$

Getting back to the intuitive understanding of the problem, it is then reasonable to consider this setup:

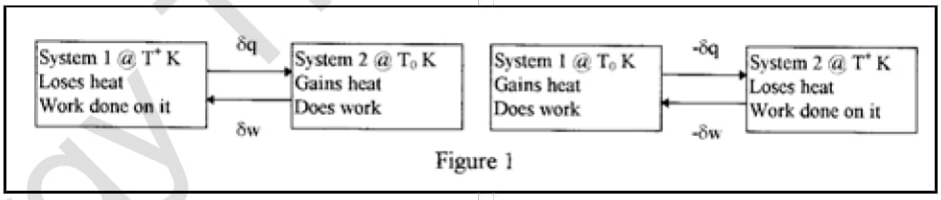


Figure 1

We consider a system made up of an infinitude of fluctuating sub-systems. Depicted above, part of the system fluctuates and migrates to some temperature T^+ above T_0. The heat flows, δq, from sub-system 1 and enters sub- system 2 which expands and does work on sub-system 1. The right hand diagrams depict the opposite.

By the First Law $dU = \delta Q - \delta W$ and observing the sign conventions shown in figure 1, the law isn't broken.

This leads to:

Theorem 1:
At constant temperature heat and work are interchangeable.

Corollary:
Is possible to do work in closed, isolated system with no static sources of energy, i.e. those at constant entropy.

Thus the theorem and corollary open up the intriguing prospect of perpetual motion if some kind of constant entropy cycle could be constructed so that microscopic work could be converted to macroscopic work.

Macroscopic work requires heat or potential energy sources and sinks - how does one do this in a system that is globally at one temperature? I knew of *spontaneous* temperature rises on *spontaneous* first order phase changes but first, I shall characterise first order phase changes.

First Order Phase Transitions

First order phase transitions are characterised by:

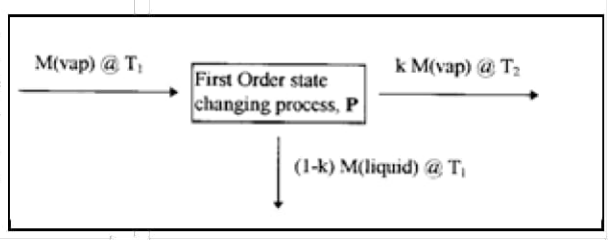
- A sudden change of properties at constant temperature.
- These property changes are sudden changes in density, compressibility and viscosity. Like the change transition from liquid to gas.
- Latent heat associated with the potential energy overcome in matter moving from the low to higher energy phase.

According to Theorem 1, heat energy does the work necessary to overcome the potential energy difference between the phases because the process occurs at constant temperature. The higher energy phase stores the microscopic work done at constant temperature (it is 'latent' or hidden). To liberate it, one must somehow take part of it and transform it so that it has different properties from the rest of the environment; it could be raised in temperature (by its own latent energy of course) and provide a source to the environment's sink. The next section shows how this can be done.

Spontaneous First Order Phase Transitions and a Phase Changing Catalyst

There exist mechanisms for spontaneously changing the phase of a substance (ref. 2). First, without considering specifics, let us model a process depicted below with the First and Second Laws, occurring at constant pressure.

Consider the (idealised) process:



New Energy Times Archive

where

M is mass of the working substance
T_1, and T_2 are Kelvin temperatures, $T_2 > T_1$
k is a mass fraction, $0 \leq k \leq 1$

Let the process occur at constant pressure. For the First Law modelling. I can use enthalpy:

$H = U + PV$

where

H is the enthalpy of a substance and is a state variable
U is the internal energy (state variable)
P is pressure
V is volume

By the conservation of energy (1st Law), Enthalpy of reactants before process = Enthalpy reactants after.

Enthalpy of M(vapour) @ T_1: $\Delta H_1 = MC_L(T_1-T_{ref}) + ML$

Enthalpy of (1-k) M(liquid) @T_1:$\Delta H_2 = (1-k)\, MC_L(T_1-T_{ref})$

Enthalpy of k M(vapour) @T_2: $\Delta H_3 = kM(C_L(T_1-T_{ref}) + L) + k\, MC_V(T_2-T_1)$

where

C_L is the specific heat capacity of the liquid phase
T_{ref} is a reference temperature
L the latent heat of phase transition.
C_v is the specific heat capacity of the vapour phase.

Thus by 1st Law $\Delta H_1 = \Delta H_2 + \Delta H_3 \Rightarrow$
$T_2-T_1=(1-k)L / kC_v$

A temperature rise is predicted by the First Law.

For the Second Law modelling I shall break the process into two steps:

Step 1:
Heat withdrawn as part of gas is condensed, (1-k) M(vapour) → (1-k) M(liquid)
Change in entropy at constant temperature $\Delta S_1 = -(1-k)\, ML / T_1$

Step 2:
Heat added as remaining vapour heated, k M(vapour) @, T_1 → k M(liquid) @ T_2
Change in entropy of substance behaving like ideal gas $\Delta S_2 = k\, MC_v \ln (T_2 / T_1)$

Total change in entropy is $\Delta S_1 + \Delta S_2 \geq 0$ by 2nd Law. Working the inequality.

$k \geq L/(T_1 C_v \ln(T_2/T_1)+L)$

All terms on the RHS are finite and positive so k is less than unity. Hence the idealised process tells us that there exists a process or 'catalyst' capable of causing a *spontaneous* temperature rise in a substance by causing a *spontaneous* phase change in the substance.

There also isn't just a temperature rise (or fall is possible, not modelled) as since there is a first order phase change, there is a density change. By the Archimedian principle, there also must be an upthrust or downthrust if the induced phase is immersed in the initial phase—thus the potential energy of the induced phase has been increased too (ref. 2, appendix).

This all occurs by Theorem 1 in conjunction with the catalyst since first order phase changes occur at constant temperature. If you doubt that such a 'catalyst' could exist, it could be realised by a hygroscopic solution in a tall vessel providing a 'head' of pressure driving water out of the bottom of the vessel through a semi-permeable membrane (ref. 2). Here the potential energy of the vapour (ref. 2) is used to reconstitute the hygroscopic substance from water so that the device behaves as a catalyst.

Figure 2 shows how the phase changing catalyst might be constructed. The vesicles and demons in the figure are relevant to later discussion. It is interesting to note that the device is making use of two constant temperature heat to work processes: the latent heat and potential energy of the vapour. The potential energy of the vapour provides the head to dnve the water from the vessel through the membrane at the bottom.

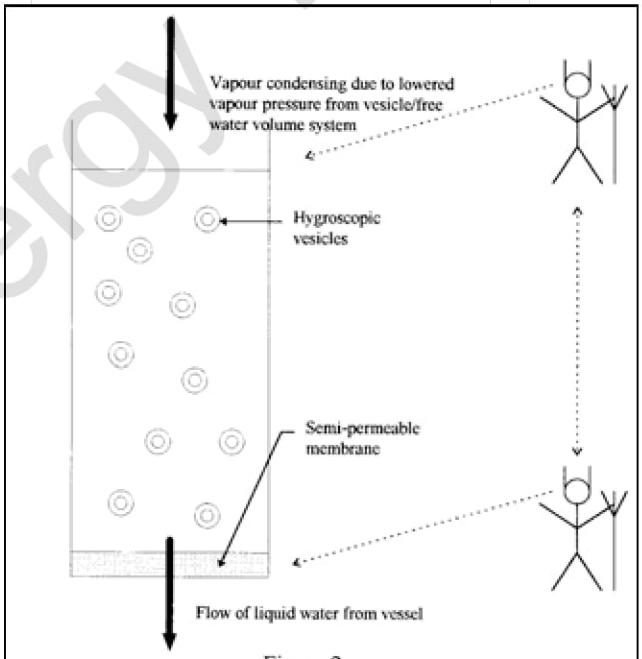


Figure 2

The tall vessel with the vesicles inside (greatly exaggerated in size) and the free water volume being separated by the micro-porous membrane at the bottom. Shown. also. are the 'ironic demons' that police the top and bottom of the vessel that stop water flowing from the bottom making the hygroscopic agent more concentrated, so that vapour doesn t condense at the top. This would be needed to stop the macroscopic perpetual flow. In the manner of Newton's *hypothesis non fingo* I find this scheme to stop the flow through the vesicle highly contrived.

The Phase Changing Catalyst Inserted into a Closed Isolated Environment - Paradox

On insertion of the phase changing catalyst into a closed, isolated environment (fig. 3) composed of two phase of a substance in (say water and water vapour), a **paradox** occurs: one of a *spontaneous* temperature difference or availability of potential energy from condensed phase at height. Applying the Second Law around the loop:

Step 1) Vaporisation of liquid: $\Delta S_V = ML / T_1$
Step 2) The entropy change of process: $\Delta S_p = -(1-k)\, ML/T_1 + k\, MC_v \ln (T_2/T_1)$
Step 3) Cooling of the exit vapour: $\Delta S_C = k\, MC_V \ln (T_1 / T_2) = -k\, MC_V \ln (T_2 / T_1)$
Step 4) Condensation of exit vapour: $\Delta S_L = -kML / T_1$

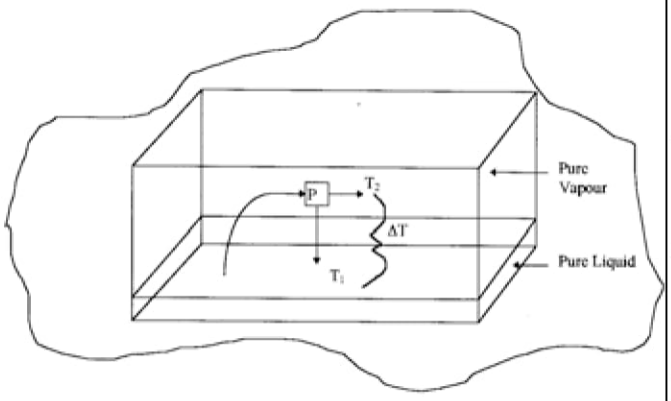
$\Delta S_{Total}=\Delta S_V+\Delta S_P+\Delta S_C+\Delta S_L=0$

Thus the Second Law *is* obeyed around the loop. A better calculation using the chemical potential to represent the entropy contribution of the matter around the loop is given in reference 2, appendix potential energy of the matter is implicitly modelled too.

It can be seen that the cycle's direction can only proceed in one direction. Steps that 'generate' entropy, power or couple those that 'consume' entropy.

The phase changing catalyst could be realised, in principle, by a hygroscopic solution in a tall vessel with a semi- permeable membrane at the bottom (ref. 2). At the top of the vessel, the vapour atmosphere would be depleted by the action of the hygroscopic solution (e.g. Calcium Chloride). In turn more water would evaporate from the reservoir to replenish the atmosphere. The condensed water in the vessel would form the necessary head to push water through the membrane (reverse osmosis) at the bottom

New Energy Times Archive



Closed, Isolated Universe
Figure 3

of the vessel back to the resenoir.

Prevention of operation of this scheme (figure 2) would require an intelligence (ironically, a demon see later section: Maxwell's Demon) to stop water condensing at the top of the vessel so that water wouldn't evaporate from the reservoir, forming a head in the vessel, so that water flows back to the reservoir. In short, something would need to conspire - non-locally at the top and bottom of the vessel to stop the cycle occurring. Nature may have its checks and balances but this would take some comprehension.

A constant entropy cycle for doing macroscopic work becomes apparent as:

- Place working substance in contact with heat reservoir.
- Working substance 'collects' heat energy and does microscopic work at constant temperature.
- Collect working substance in higher energy state (e.g. vapour phase or vapour at altitude).
- Promote phase change to liberate temperature rise or change in density etc. to liberate potential energy (formation of source).
- Run heat engine between source and sink - waste heat and friction returned to reservoir.
- Return used working substance to main body of working substance.

A variation of this is possible if working substance away from the heat reservoir can be made to spontaneously cool (like adding salt to ice) so that a sink is formed, heat then flows from reservoir to sink.

Comparison has been made to heat pipes but this is nothing like them as there, the environment is providing a source and sink. Here I stress that there is only one reservoir which is the isothermal environment.

A Realistic Device and its Applications

The tall vessel discussed previously is not likely to prove practical due to high osmotic pressures. Figure 4 depicts a realistic device.

Reference 3
"The core technology can be implemented by making small robust particles 1, 2 (figure 4) whose enclosing walls are a semi-permeable membrane 1 and innards are an aqueous hygroscopic solution 2. I shall now prove that a many of these particles spontaneously suspend themselves in a *free water volume*.

(Vesicles refers to component particles 1, 2)
Let N spherical vesicles (the don't have to spherical but they will most likely be) of radius r be in a volume of water V.

Total volume of vesicles = $(4/3)N\pi r^3$
Total volume of water and vesicles = $V + (4/3)N\pi r^3$

The solution inside the vesicles is made from a bulk solution of hygroscopic agent and water of concentration **c** say. By diffusion and at equilibrium, the chemical potential of water inside the vesicle is equal to the chemical potential of water outside vesicle. Thus approximately:
Concentration of water inside vesicle = Concentration of water outside the vesicle
$\Rightarrow$ Total volume of water / Total volume of water and vesicles = c
$\Rightarrow$ $V / (V + 4/3N\pi r^3) = c$ (approximately, neglect width of vesicle wall)

Solving for V, the free volume of diffused water:
$V=(4/3)N\pi r^3(c/1-c)$

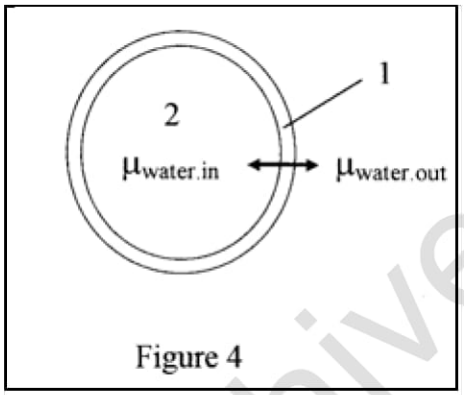


Figure 4

Thus,

Free Water Volume = Total Volume of Vesicles x Constant

The reasoning behind this may be more believable if we imagine these particles to be closed packed — one would expect the interstices *at least* to be full of water."

Incidentally the device, if feasible, would have application to the following arenas (ref. 3): wet exhaust scrubbers, self-regenerative dehumidifiers, water desalination /purlfication, self-irrigating artificial soil and energy production.

Maxwell's Demon

In the mid-nineteenth century, thermodynamics was beginning to be understood at the microscopic level as random motions of atoms and molecules (etc.). It was seen that high grade energy sources were used up and became low grade due to their expression of energy becoming more random and (maybe) less useful. The waste heat of Carnot ('calorique' ref. 13) was formulated into a thermodynamic property 'entropy' by Clausius and Kelvin and after Boltzmann's insight with statistical mechanics, became synonymous with increasing disorder.

About this time, Maxwell (4) posed his Demon problem: 'A being so heightened in senses as to be able to observe individual particles and sort them.' The essence of this was that energy is conserved but gets

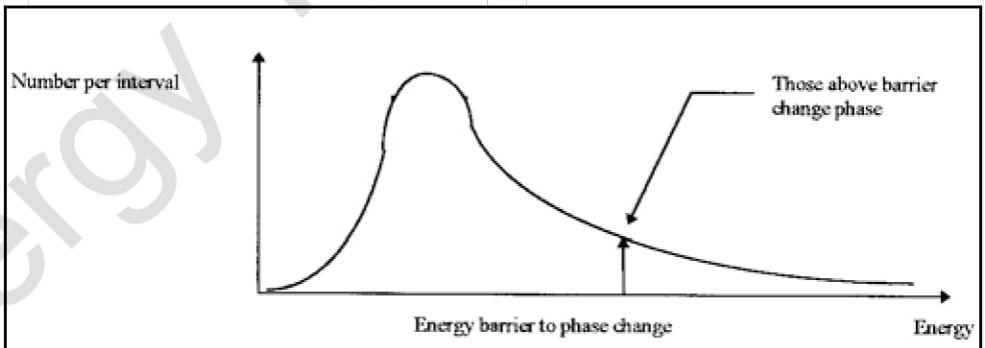


Figure 5

New Energy Times Archive

degraded (becomes heat); due to the spread in thermal particle energies (fig 5 Maxwell-Boltzmann distribution) a heat sink could be reconstituted by taking energetic particles away from their sluggish brethren to form a new heat source. This is fundamentally what is needed to generate a perpetual motion machine of the second kind (first kind violates 1st law of thermodynamics).

Why Earlier Schemes have Failed

Putting aside amateur, second kind, perpetuum mobile makers (they always believe some kind of new low friction widget will show their machine working), who never attack the core of the problem — that of heat reuse and the Maxwell Demon problem; serious research has concentrated on the fundamental problem — is it possible to sort thermal particles and accrue net energy production or is it possible in principle to sort something so small and not violate some measurement limitation principle (Heisenburg Principle for instance).

In my paper (2) I have placed existing analyses into two camps: Autonomous-Small-Machines and Measurement-Action-Engines:

Autonomous small machines are threshold sorting devices. They have to be small as the entities they wish to sort are small, any larger and bulk averaging diminishes any fluctuation effect: for instance large bodies are not subject to Brownian motion. It is for this reason and because 'small machines' are made of matter that their sorting action is curtailed by the random movement of the sorting element. Smoluchowski (5, The Pressure Demon, account of paper in ref. 9) and Feynman (6, The Ratchet and Pawl) dispel these types of devices.

The second type 'Measurement-Action-Engines' sort thermal particles by measuring them (hence energy transfer), making a decision and then opening some gate or the like, then they reset the sorting apparatus. As early as 1859 (recounted ref. 9) G. Kirchoff pointed out as a consequence of the Second Law of Thermodynamics that radiation from an isothermal system (black-body radiation) is uniform. Brillouin (8) recounts and collates papers dealing with this measurement aspect. He recounts that because of the 'photon gas' pervading the isothermal environment no estimation of the amount of matter that the enclosure contains could ever be made - it is independent of the matter. He then proves that energy greater than the black-body radiation must be injected into the enclosure leading to a minimum increase in entropy of the universe of kT ln 2 per 'bit' of information, and that this entropy can never be cancelled by the 'negentropy' of the sorting process.

A further problem with Measurement-Action-Engines is the resetting of the sorting apparatus at the end of the cycle. Szilard (7) realised that information would have to be kept on the state of the machine, which would then be read and acted upon. For the same reason as in the previous paragraph, Brillouin (8) proved that the minimum cost of information is kT ln 2 and that this can never be recovered.

Now the second type of analysis has led to the subject of information theory (15), where the energy cost of sending and retrieving information is analysed. My paragraph above was written many months ago in my first paper. Since then, something of a quiet revolution is happening, as it is being seen that Brillouin thoughts were on linear systems and hence limited. Rolf Landauer published a paper in *Science* (June 1996) in which he believes that there can be no energy cost in transmitting information in highly non-linear systems, heat is somehow reused... Thermodynamics and Information Theory go hand in hand.

A Third Type of Demon

I now introduce a third type of Maxwell Demon that affects its sorting at the molecular level and hence is an autonomous small machine, but the sorting threshold is not matter based but an energy threshold that will not suffer Brownian motion. No measurement needs to be made for the system to sort spontaneously and this is a reflection of the underlying dynamics of the system which thermodynamics provides a macroscopic phenomenonlogical description of.

Microscopic Work can Sort

Matter will distribute itself in a volume and seek thermodynamic equilibrium. If there is a potential that the matter responds to (gravity for instance) — it is irrefutable that with increasing altitude in the field, the matter has more and more potential energy, i.e. a graph of height against potential energy would yield an increasing graph. Theorem one, says that the thermal particles can move about (this is a dynamic scenario) at constant temperature and do work.

Similarly, particles across a first order phase change can do work at constant temperature. Figure 5 shows how an energy barrier between two phases sorts particles, so that the higher energy phase has a 'latent heat'.

The Need for Phase Changes in Order to do Macroscopic Work

Now obviously, this sorted field of particles is at constant temperature and hence is at equilibrium. The higher energy particles (those at altitude or in the vapour phase) can be collected, but nothing can be done to liberate their energy to do macroscopic work, unless they can be differentiated from their surroundings.

This leads to:

Theorem 2:

> A Perpetuum Mobile of the sec ond kind must utilise two or more phase changes in its working substance.

Since to liberate macroscopic work from the working substance collected in the higher energy state, the working substance must be differentiated from its surroundings so that a potential (a chemical, electrical, gravitational (on density changes), heat gradient, etc.) or region of different properties can be formed so that there is a net macroscopic flow. This is because, by definition, a phase is a region of a system with different thermodynamic properties.

For instance, with the first order phase changing catalyst, which effectively uses two sorting mechanisms, the working substance is collected in the vapour phase at altitude and condensed. The condensation yields: a temperature rise (heat gradient) and a density change (potential energy).

It is interesting to note that phase transitions are non-linear phenomena (discontinuity in Gibbs function etc.) and maybe this strikes a chord with the work of the information theorists and their nonlinear systems mentioned in the previous subsection. I hazard a guess.

Other researchers have come across other systems but have failed to grasp the reason required for the phase change: (D. Wirtz, G.G. Fuller *Phys. Rev.Lett.*71 (1993) 2236 and W.D. Bauer http://www/overunity.de/bauer/index.html) utilising mixtures which separate on application of an intense electrical potential.

I hazard another guess, which remains to be rigorously proven, that only first order phase change perpetuum mobiles can operate on their own, spontaneously - so to speak. I believe that other phase changing mechanisms (2nd Order - discontinuities in heat capacity and other properties, etc.) must have an invoking mechanism such as the cycling fields of the capacitor in Bauer's work. I say this because, first order phase changes undergo property changes (ref. 1 chap. 'Change of phase' table 10.1) of density or rise in temperature

New Energy Times Archive

of working substance that can power something directly. Other phase changes only have a change in a physical property (say dielectric susceptibility) which can only be utilised indirectly by aid of surrounding machinery. That is not to say that they may be more efficient or satisfying in operation/engineering complexity than the first order type.

Why Resistive Electrical Thermal Noise Cannot do Work

As an aside, I shall discuss another apparent constant temperature heat to work phenomena - the ' electrical noise and diode rectifier demon' to prove a simple obvious principle.

A thermodynamic theorem was established earlier (theorem one) as a view to the paradox discussed in this paper of, spontaneous temperature rise on phase change and was also viewed by statistical mechanics concepts. What then of other constant temperature processes? Consider thermal noise in resistors (Nyquist 10) being rectified by a diode. The idea is discussed by Brillouin (8, 12) and Bridgman (11). They seek to prove that a rectified current would violate the Second Law by doing work.

In my view the diode is irrelevant and no rectification is needed, although according to the previous section, I would view it as a sorting element due to its 'one way' nature. The noise source is bipolar but this doesn't matter, if we assume that, where this voltage source does work as equivalent to resistive dissipation; this depends on the square of the driving voltage source - no diode is needed.

The true reason why the thermal e.m.f. cannot be utilised is Kirchoff's Ist circuit law, continuity of current. The power liberated by the device exactly cancels I^2R loses from current through the resistor as it operates. No scheme can be permuted to stop this current flow from occurring.

Therefore although electrical thermal noise is another constant temperature heat to work process, the point of energy liberation cannot be separated from the dissipation in the device which just cancels. The phase change catalyst has no inherent reason, apart form design constraints, to be dissipating energy that just cancels energy liberated by its operation. This introduces the obvious principle that:

Principle of Limit to Intrinsic Energy Dissipation by Heat Pump Devices

For a constant temperature heat to work catalyst to operate, energy liberation by the device must exceed intrinsic energy dissipation by the device.

Summary of Phenomena that are likely Candidates for Perpetnum Mobile

• A working substance made from a material which will undergo first order phase changes which can allow spontaneous temperature rises, decreases and changes in density which can directly form the source and sink for operation of conventional heat or potential energy engines within the isothermal environment.

•A working substance utilising higher order phase changes which cause the change in some property of the material which can be induced to do work by surrounding controlling machinery.

• The devices must have no intrinsic energy dissipation arising from their operation which cancels any net expression of energy generation.

Theorem 1.

• Spontaneous temperature rise is possible by First Order Phase Changes.

• A Phase Changing Catalyst can be constructed and inserted into a closed, isolated system to manifest macroscopic perpetual motion.

• First order phase change is a self sorting process and a realisation of the Maxwell Demon idea. The potential barrier to phase change and the system of particles affects both measurement. sorting and information storage required for the Maxwell Demon problem.

If one can accept this and construct a spontaneous heat pump, here is the ultimate consequence:

Consider the diagram (fig. 6) where heat energy is pumped from one large system

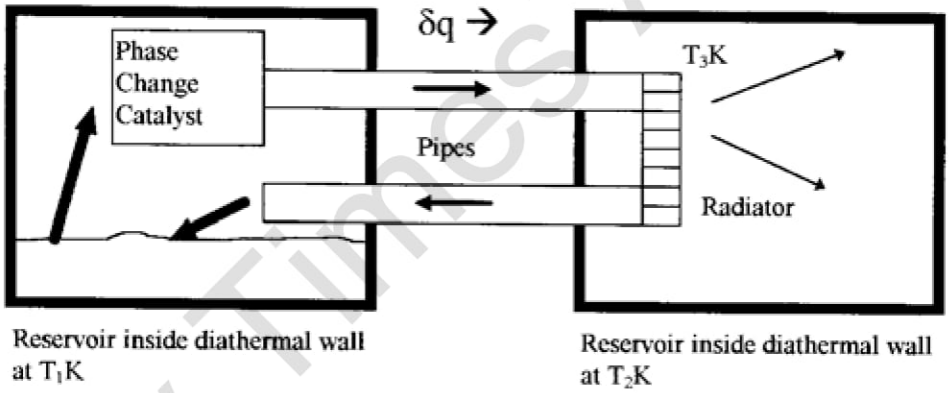


Figure 6

(for ease of analysis) at T_1K to another at T_2K where $T_2 > T_1$. This could be arranged by the output from the phase changing catalyst (fig. 3), elevated in temperature to T_3 K, being piped around a radiator circuit. The heat, δq, is radiated into the second reservoir because $T_3 > T_2$.

Entropy change in system1: $-\delta q/T_1$
Entropy change in system 2: $+\delta q / T_2$
Total change in entropy is the sum:
$\delta S_{total} = \delta q\ (T_1 - T_2) / T_1T_2$

Since $T_2 > T_1$ the systems are obviously losing entropy and so the entropy of the universe is decreasing! This shows that the Second Law is not a Law if it is breakable!

The Second Law was gradually conceived by Carnot (not well known, 'calorique' ref. 13), Clausius and Kelvin in order to give a basis to our belief that certain thermodynamic transactions just don't occur — for instance a bar of iron doesn't spontaneously redistribute its internal

Conclusion and Discussion:
The Correct Interpretation of Entropy as Dissipated Energy and Time's True Arrow

This section seeks to show that the Second Law is limited because heat can be 're-cycled.' It then seeks to find a principle which encapsulates what we think of as the Second Law and the wealth of observational experience which traditionally maintains it. Therefore a Principle of Potential Decrease and a Law of Loss of Information is developed. Due to the Second Law's fundamental nature and association with causality and degradation, a constant entropy system is used to discuss dynamic equilibrium and the flow of time, memory and information loss.

Spontaneous Heat Pumps, Entropy *Decrease* and Heat Recycling

This presentation has been drawn along the lines that:

• Microscopic work, at least, is possible in a constant entropy/temperature system -

New Energy Times Archive

energy so that it glows red hot at one end and icy at the other. This reasoning was put on an even more reasonable footing by Boltzmann's incredible insight of linking it to the most likely distribution of energy amongst system states and the equipartition of energy. It rapidly became synonymous with the sense of direction of time. However, figure 6 suggests that heat can be re-cycled and is not a dead end of energy transformation.

Principle of Potential Decrease

The sense of time is hard to deny, one remembers the past and not the future. If the ideas presented in this paper are correct, what then of the Second Law? What then of the Entropy concept? A return to earlier definitions of entropy as 'uncom - pensated' or waste heat is needed, just as it was originally formulated by engineers modelling steam engines (Carrot ref. 13).

Boltzmann relation is the mechanism of heat flow

'Entropy' increases when there is a flow of heat by temperature or matter (chemical potential) gradients. The Boltzmann relation only provides the mechanism by which this energy, distributed in a highly improbable manner, finds its most likely distribution (equipartion of energy).

Time's Arrow manifests itself as a more fundamental principle: flow from high to low potential. It doesn't matter if the potential is a Gravitational, Electrical, Magnetic, Temperature or Diffusional (chemical potential).

So how then does the phase changing cycle discussed in this paper work? Surely the potential of the working substance in a closed loop can't go on decreasing for ever, it must be raised at some point by energy input? Yes, this is done by the Heat to Work Theorem (One) — the heat is reused — heat is not a dead end of energy transformation.

Due to the principal of Potential Decrease (Time's Arrow), the cycle can only go around one way: water vapour cannot evaporate from the reservoir and spontaneously become hot without the assistance of the catalyst (which utilises a potential decrease), there is no incentive.

It would seem that matter left to exist autonomously without the intervention of intelligent beings, follows some kind of Universal 'hardwiring' of Potential Decrease.

Least Action Principle in Other Fields

It may seem that a 'Principle of Potential Decrease' is axiomatic, but there is, yet, another level of description below this and a more fundamental view of things: Least Action Principles.

If we regard a matter and temperature distribution as a field (in a sense that if a small piece of matter was introduced that didn't perturb it too much, we could predict its motion), we have via the Boltzmann relation the mechanism by which this field 'works': it seeks to find the most probable distribution of matter in it. Something is minimised or made less —improbable spatial arrangements of matter (non-equilibrium thermodynamics and spontaneous ordering is relevant but requires further work on my part to integrate it with this argument).

Least Action has been used in this century to explain how other fields 'work': Dynamics in General Relativity is viewed as the shortest path of bodies in a curved space; or how 'action at a distance' works in Quantum Electro and Chromodynamics - the sum over many paths approach.

That an overall encapsulating principle for the Second Law may be Least Action is pointed to by a citation in Bauer's paper (http://www/overunity.de/bauer/index.html) of W.G. Hoover *Phys.Lettr.* A204 (1995) p.l33-135.

Thermodynamics is Multi-bodied Dynamics

This section shall investigate whether, on its own, the principle of potential decrease is enough to give the direction of time. Most specifically discussed are: The dynamic equilibrium state which the Second Law effectively defines as time having stopped — there is no macroscopic change but time has not stopped; A teacup being made (by an automaton) and smashed in a constant entropy system which apparently suggests that time always follows the same path and fate is deterministic. The 'Teacup Paradox' is raised because when the Second Law is challenged, people immediately assume that one is implying that the lever of time is thrown in reverse —every little event in its break- up can be reenacted; this is not so.

Chaotic Traiectories in state space

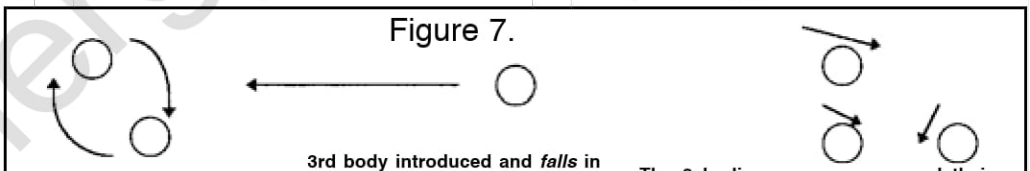
Thermodynamics is a phenomenonlogical (by measurement) procedure for describing many bodied systems with only a few measured parameters. Its foundation is the statistical mechanics which are based on time invariant laws — be they approximated Newtonian descriptions or Quantum mechanics. How can a direction of time emerge if the equations describing the system are time reversible? One might imagine that the fundamental dynamics are wrong - this doesn't have to be so...

A system when modelled is recognised as time invariant because the equations of motion have the same form when 't ' is negated and execute the same path in state space. For instance a 2 body, nondissipative, mass spring system doesn't appear to be obeying the principle of potential decrease — the masses spontaneously rise out of their potential wells. Simple scenarios lead to simple time invariant equations. However, three body problem does not execute the same path in phase space (there aren't simple algebraic equations to describe this) — it is sensitive to the initial conditions (ref. 14). Time's arrow becomes manifest by the asymmetry in the phase space description's evolution. This negates Poincare 'Return Principle' (ref. 14) and determinism. The agent of change in the system is always the desire for matter to fall in a potential though.

Dynamic Equilibrium

Consider the figure below and the constancy of entropy which characterises the dynamic equilibrium state (and the thermodynamic cycle discussed). Here, entropy constancy says time has stopped - this is nonsense. In a sense, figure 7 represents the birth of the thermodynamic, many bodied approach to describing a system.

Figure 7.



2 bodied system revolving around centre of mass. Time invariant. 'Low Entropy'

3rd body introduced and *falls* in potential field. In a sense, the 3rd body diffuses (lowers chemical potential) towards 2 body system.

The 3 bodies now move around their mutual centre of mass. The system has higher but *constant* entropy. The motion is chaotic. 'Coherent ' motion has become *dissipated* in 'incoherent' 3 body motion.

Thus, in the end, the system has reached thermodynamic equilibrium (no more chemical or temperature gradients) and entropy is constant but time hasn't stopped. There is a clear sense of time due to the chaotic non-reversible paths of the particles in phase space.

Constant entropy systems and the phase

New Energy Times Archive

changing catalyst shall now be used as a test setting for two scenarios to show that, even though I believe work is possible in constant entropy systems (perpetual motion). Time still has a direction and a sequence of events and is not merely reversible. This avoids all the absurd paradoxes people fear if the Second Law is shown invalid or even partially true.

The 'Teacup Paradox' and Loss of Information

Returning to a gas in a closed dynamic equilibrium state of constant entropy, something is increasing with time — loss of information about the system once set off from its initial conditions. This concurs with Boltzmann's H function (ref. 14), collapse of quantum wavefunction on measurement, uncertainty due to Heisenberg's Principle or non-linear dynamics of Chaos Theory, and the rarely repeating complex paths of particles in state space. This requires further work. The work of Bennet and Landauer's (ref. 15) on reversible computation, where they regard information as not being lost, must also be reconciled.

According to the theory in this paper, this is possible:

Energy → Teacup made by Automaton → Smash → Recoup heat energy by phase change catalyst Remake teacup...

but not this:

Energy → Teacup made → Smash → 'Unsmashæ → Same teacup

The first instance is fully just)fied by the Principle of Potential Decrease and the Heat to Work Theorem at each step. Time still has an arrow even though this is a constant entropy system. The second case cannot occur as the 'un-smash' step violates the Principle of Potential Decrease —just what incentive is there, without energy input, for the cup to reassemble itself?

Also, clear from the first case, we can reuse the energy used to make the cup to make another cup, but it isn't the same cup - even if made by an automaton. All the information about the first cup's constituent atom positions and their states is lost. One could use a computer to store a memory template of all the atoms and their states (it would in effect be a matter replicator), but the very act of measurement would change that template Looking identical is not the same as being identical. i.e. following something's exact path through time and space and interactions at that point. Information is lost. In this system, time isn't apparently repeating itself — there is indeterminacy.

Causality and Memory - why we remember the past

Constant entropy systems provide a test seeing for our ideas of memory. Memory is a meaningful configuration of matter or potential interpreted in the future. This configuration of maner is arrived by changing its state (or position to avoid considerations of potential energy) to a new state and then dissipating energy. If this change of state is done in the constant entropy system discussed in this paper, the Second Law gives no indication of movement of time since it is a constant entropy system. The same problem of causality arises as in the previous teacup 'unsmash' case, time appears reversible - in which case, we should remember the future! I shall prove that this cannot be so by the Principle of Potential Decrease.

Crucial to the memory's operation is the potential decrease principle. Figure 8 shows a 'bit' of information being read: it is at high potential and so spontaneously transfers its potential to a copy bit. The storage bit is then returned to its original state but the energy to do this came from the phase change thermodynamic cycle which can only proceed in one direction. Overall, information has not come from the future, time has an arrow even though these events occur in a constant entropy system.

This leads me to believe that:

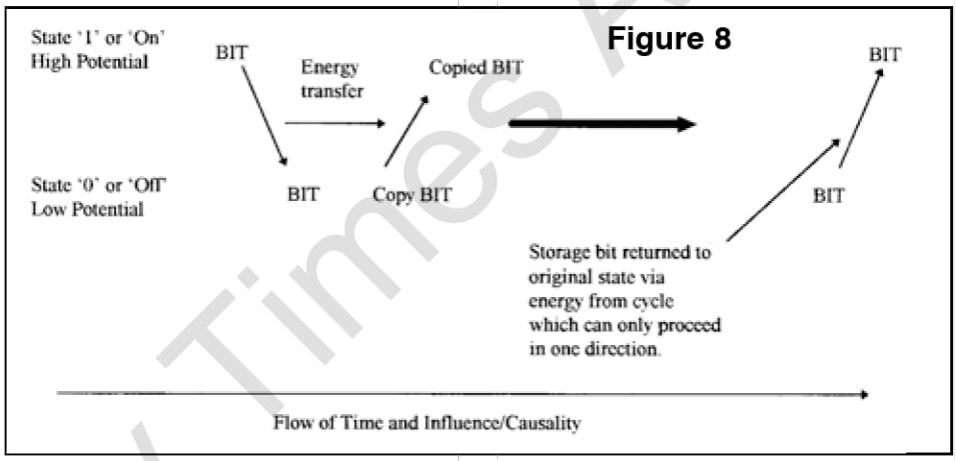
Time 's Arrow is: Potential Decrease and Information

Last thoughts and summary

What then of our concept of 'energy'? A constant entropy system cycles energy *ad infinitum* Even if you don't believe this presentation about macroscopic perpetual motion -—what of microscopic perpetual motion? Current wisdom is that 'energy makes things move' — the dynamic equilibrium state persists *without energy input*. What then could be said to be making things move? I believe what makes things move (i.e. dynamics) is *a potential and a principle of potenhal decrease*. Energy is, maybe, just a conserved measurement we attach too much significance to without the underlying principle — though this point is subtle and hard to get into the existing mindset.

This paper discussed a phase changing thermodynamic cycle of matter in a closed, isolated system at constant entropy that could only proceed in one direction by a principle of potential decrease. Perpetual motion is believed possible by theorems 1 and 2.

The spirit of Second Law is not threatened but, perhaps, shown to be a part of a greater truth, diverse research paths appear to be converging. Experiment will prove the conjecture in this paper The objective is to build the hygroscopic vesicle device. This experiment I consider blunt, it doesn't require complicated data analysis and interpretation or the search for a signal hidden in noise: should the vesicles spontaneously suspend themselves in a free volume of water — everything follows from there.



References

1. Adkins C.J., *Equilibrium Thermodyna-mics*, 3rd ed., Cambridge University Press.

2. Cornwall, R.O., "A Thermodynamic Cycle Based on First Order Phase Changes",http://www.iesun1.city.ac.uk/cornwall/paper1e.html.

3. Cornwall, R.O., "An Energy Efficient Method for Condensing Water Vapour, " http://www.iesun1.city.ac.uk/cornwall/water.html.

4. Maxwell J.C., *Theory of Heat*, Chap. 12, Longmans, Green and Co., London 1871.

5. Smoluchowski, M. von, *Experimentell nachweisbane der ublichen Thermo-dynamik widersprechende*

New Energy Times Archive

der ublichen Thermo-dynamik widersprechende Molehular-phanomene, *Physik Z.* 13, 1069-1080 (1912).

6. Feynman Richard P., *The Feynman Lectures on Physics*, Vol. 1, pp 46.1 - 46.9 Addison-Wesley, Reading, Massachusetts 1963.

7. Szilard L., "On the Decrease of Entropy in a Thermodynamic System by the Intervenhon of Intelligent Beings," *Physik Z.* 53, 840-856 (1929), translation: *Behavioral Science* 9, 300-310 (1964).

8. Brillouin L., *Science and Informahon Theory*, Chaps. 13, 14 Academic Press Inc., New York 1956.

9. Harvey S. Leff, Andrew F. Rex, *Maxwell 's Demon: Entropy, Information and Computing*, Adam Hilger, Bristol 1991.

10. Nyquist H., *Phys. Rev.* 32, 110 (1928).

11. Bridgman P. W., *Phys. Rev.* 31, 101 (1928).

12. Brillouin L., *Phys. Rev.* 78, 627 (1950).

13. Callendar, H.L., *Prog. Phys. Soc.* (London) 23, 153(1911), and LaMer V.K., *Am. J. Phys.* 23, 95 (1955).

14. Coveney, P., Highfield, R., *The Arrow of Time*: Chapter, "Thermodynamics, Boltzmann 's Arrow of Time," Flamingo 1991.

"Breaking Through,"continued from 12

research scientist at the Lunar and Planetary Laboratory of the University of Arizona, writing in *Outlook* (July 27th). What is so extraordinary about Dessler's assertions is that he thinks Frank has been treated fairly all along. He is proud to have been the editor in 1986 who published Dr. Frank's initial papers on small comets. But then he says, "Controversial papers, such as the small-comet hypothesis, that seek to overturn the conventional wisdom are almost always wrong. But not all are." Later he says, "Frank's depiction of a unitary scientific establishment working to keep out innovative ideas is as implausible as it is wrong." Sorry, Dr. Dessler, Dr. Frank is absolutely correct: scientific vandalism happened in the small-comets controversy. It also happened for cold fusion—roughly in the same time period.

Dr. Dessler astonishes us with these incomprehensible sentiments: "But for an idea to gain adherents, it must be perceived as promising— and Frank's hypothesis is not. It does not help to solve, or even aid in understanding, any existing problem in space science... Worse, it creates problems." He goes on to explain the problems for theorists that mini-comets would pose. He complains that "only Frank and his colleagues" have been able to detect the mini-comets and that there are no "confirming observations" or "supporting theories." Arrogantly invoking Nature herself, Dessler says, "Nature imposes on us the procedures we must follow if we are to find the truth." Translation: Don't bother me with data, I've got theories to defend.

Just think of what will happen to Dessler's world view when he has to face the implications of Modern Alchemy!

THE HYPOTHESIS AND THE EQUATIONS OF THE UNIFIED MATTER FIELD

A.A. Nassikas

Reviewed by X.D.Spiliotis

Larissa Ed. Instit. of Technology
10, Ethnikis Antistasseos str
41 335 Larissa Greece
e-mail <a.a.nassikas@dias.teilar.gr>

PUBLISHED IN THE PROCEEDINGS OF INTERNATIONAL CONFERENCE "NEW IDEAS IN NATURAL SCIENCES", ST. PETERSBURG'S PHYSICS SOCIETY, 1996

ABSTRACT

The purpose of this paper is to state the equations of the unified matter field which is derived from the hypothesis that any spacetime can be regarded as matter. Thus the unification of the GRT [General Relativity Theory] and the QM [Quantum Mechanics] can be approximated, the operators of spacetime magnitudes can be stated and the matter field can be described—in a Euclidean spacetime of reference— in its whole extent with spacetime wave functions. The charge space is regarded as an imaginary gravitational space which coexists with the real one, the two of them being interconnected. Thus a system of equations of space as a whole including the antimatter is stated and a possibility of application in gravitational technology is shown. A verification is given through the fractal geometry which seems to apply in many matter systems characterized by the property of selfsimilarity.

INTRODUCTION

In the case that space and time are considered to correspond to the deeper reasons of reality, a scientific formalism is insufficient and a philosophical quest is needed. According to the process through which Godel's theorem is proved [1] we have the following statement "A": "There exists no system of axioms, those of logic included, represented in Peano's arithmetic , which will not lead into contradiction." Statement "A" is concluded on the basis of the axioms of "Principia Mathematica" [1,2], which codify the typical logic, and Peano's axioms which declare the existence of time since they claim the existence of "earlier" and "posterior." Time, however, implies space, since space must be the containing of any matter, e.g. the containing of a time-measuring system. If for reasons of communication consistency we claim the propriety of logic [3], statement "A" will constitute an application of logic in arithmetic and furthermore an application of logic in statements concerning space and time. The contradiction of statement "A" implies that space and time are not simply mental categories as Kant [4] believed, but they behave as reality itself. This leads us to the hypothesis that spacetime may be matter which really is uncertain. With this hypothesis as basis, any infinitesimal spacetime behaves like a matter wave, which is —according to the spirit of this work—the basic concept of the unified matter field. It must be noted that there are many ways of approaching the unified field, as through the gauge theories, the superstring theory [5] and new axioms as the axiom of the unity of space-matter-time [6].

The present work is an extension of a previous one with title "The Hypothesis of the Unified Field and the Principles of its Dual Interpretation"[7]. This hypothesis can be stated through the following principles:

Principle I. In the whole extent of a matter field there does not exist any privileged area, and any spacetime of it contains energy due to the spacetime itself, which is matter.

According to the hitherto gained experience this principle can be stated as follows:

"Any infinitesimal spacetime can be regarded as a particle wave"

Principle II: In the whole extent of a particle field only those consequenses of the GRT are valid which are compatible with principle I.

The only consequense of the GRT in the unified matter field is that[7]:

$$E = DE_0 \int trdr^3$$

which is derived from the eqn:

$$dE = DE_0 dV_0 tr \quad \text{or} \quad DE/dE_0 = \tau/\tau_0 \qquad (a)$$

where DE_0 the energy density, dV_0 the infinitesimal volume of the spacetime of reference to which dE corresponds, tr the relative time and τ the time of a phenomenon of comparison[7]. From eqn (a) we may

Infinite Energy Archive

notice that τ is equivalent with— i.e it can measure— the energy dE of any oscillating spacetime element. Thus in the form of an axiom, which could be another expression of principle II, eqn (a) is stated as follows:

"The energy of any oscillating infinitesimal spacetime is equivalent to its internal time."

where as internal time we call the mentioned time τ. This statement is not relativistic because it is not valid always for the mean value of relative volume. However it becomes relativistic for tr=const. which can be considered as valid for the eigenvalues of the spacetime magnitudes of any particle field, and for the case of any euclidean spacetime of reference.

Principle I leads to the folowing statements:

Statement I: A particle field can be described through a spacetime wave function which is identical with the particle wave function of the field.

Statement II : Any physical magnitude can be expressed, in a coordinate system of a euclidean space, both as a spacetime and as a quantum magnitude.

From principle I the folowing corollary holds:

Corollary I: The existence or the non existence of energy implies the existence or the non existence of spacetime, and consequently of any geometry.

The main conclusions of the mentioned hypothesis are:

1) In a particle field, relative time, relative volume and the square of the relative length (in a direction $\vec{n}$ with respect to the spacetime of reference with energy $E_0=m_0c^2$) have operators:

$$\hat{\overline{tr}} = \frac{i\hbar}{E_0}\frac{\partial}{\partial t}, \quad \hat{\overline{vr}} = -\frac{iE_0}{\hbar}\frac{1}{\partial/\partial t}, \quad (\hat{\overline{lr}}_n)^2 = 1 - c^2\frac{\partial^2/\partial x_n^2}{\partial^2/\partial t^2} \qquad \text{(b)}$$

2) The acceleration of gravity in a matter spacetime system is:

$$\bar{g}(r,t) = \frac{c^2}{P(r,t)}\nabla P(r,t) = \frac{c^2}{\overline{tr}(r,t)}\nabla\overline{tr}(r,t) \qquad \text{(c)}$$

where P(r,t) the matter position probability density of the system. This equation shows the unification of all forces since it is valid for all gravitational fields.

3) It is valid that

$$E\langle V_E\rangle = hc \qquad \text{(d)}$$

where E an energy eigenvalue of a gravitational particle field and $\langle V_E\rangle$ the mean value of the volume which contains this energy .

As spacetime of reference of a particle field we define a Euclidean spacetime to which through a coordinate transformation the field corresponds. This spacetime of reference is not only a geometrical notion, since according to the present hypothesis it is matter; any magnitude of it will be denoted by the subscript $_0$. A point A_0 of the spacetime of reference by the action of the field occupies a position $A \neq A_0$. Thus we have the transformation $A \rightarrow A_0$

through the transformations

$$\chi^i \rightarrow \chi^{D^i} = f(\chi^i)$$

which are not simply coordinate transformations but transformations of deformity. In this paper when we refer to description through a coordinate system of a euclidean spacetime of reference we mean the description through the transformations of deformity which apply to the euclidean spacetime of reference which has not been deformed by the action of the field. Any magnitude of the field eg. relative time or relative length in a direction $\vec{n}$, is described through a coordinate system of the spacetime of reference but corresponds to that point of the field which is defined through the transformations of deformity. Thus the statements I,II do apply, since the description of a particle field according to the QM is achieved by the aid of a ψ wave function through a coordinate system of a euclidean space which has not been deformed by the action of the field.

THE EQUATIONS OF THE UNIFIED MATTER FIELD

As image of a field it is defined *the hypothetical field which consists of the reference spacetime at every point of which it is considered that the real characteristics of the corresponding, through the transformations of deformity, point of the field exist.* A relative spacetime magnitude according to statement II can be expressed also with quantum terms in the image of a particle field. If Sr is a relative-with respect to the spacetime of reference-spacetime magnitude, it will be valid that:

$$\hat{\overline{Sr}}\,\psi = \langle Sr\rangle\psi, \quad \frac{P(r,t)}{\psi}\hat{\overline{Sr}}\,\psi = \langle Sr\rangle P(r,t), \quad \frac{1}{V_0}\int\overline{sr}\,dr^3 = \int\frac{P(r,t)}{\psi}\hat{\overline{Sr}}\,\psi\,dr^3 = \int\langle Sr\rangle P(r,t)dr^3 = \int\langle\overline{sr}\rangle P(r,t)dr^3$$
$$\text{and} \quad \overline{sr} = \langle\overline{sr}\rangle V_0 P(r,t) \qquad (1)$$

where $\overline{sr}(r,t)$ is the observable mean value of that magnitude at point (r,t) of the image of the field and V_0 the volume of the reference spacetime. Equation (1) is compatible with corrolary I according to which the eixistence or not of energy entails the existence or not of geometry. In order for a complex relative magnitude to exist so that $\sigma r(r,t) = c_{sr}\psi$ and $sr = \delta_s|\sigma r|^2$ (statement I) it should be valid:

$$c_{sr} = (\langle\overline{sr}\rangle V_0)^{1/2} \text{ and } P(r,t) = \delta_s|\psi|^2 \text{ where } \delta_s = 1 \text{ for matter and } \delta_s = -1 \text{ for antimatter.}$$

The possibility that a negative proabability density exists will be shown later. In this case the angle between the real and imaginary axis is not always equal to 90° and P is not restricted to the form $\psi^*\psi$ or $\psi^+\psi$ [7]. That is possible because the factor that gives sense to the complex representation is the physical meaning of various magnitudes and not the complex representation itslef. [7] Thus it holds:

$$\sigma r = (\langle\overline{sr}\rangle V_0)^{1/2}.\psi, \quad \tau r = (\langle\overline{tr}\rangle V_0)^{1/2}\psi, \quad \lambda r_n = (\langle\overline{lr_n}\rangle V_0)^{1/2}.\psi$$
$$\text{and} \quad \overline{sr} = \delta_s|\sigma r|^2, \quad \overline{tr} = \delta_s|\tau r|^2, \quad \overline{lr_n} = \delta_s|\lambda r_n|^2 \qquad (2)$$

where σr, τr, λr_n and complex spacetime relative magnitude, the complex relative time and the complex relative length in direction $\vec{n}$ respectively.

The analysis which has been made in the spirit of this work [7] has shown that a particle field is possible to be described with spacetime terms. However, there always exists a function ψ depending on a mass m. A more general description of space shoudl be independent of any notion of mass. In a system with the $h/2\pi = c = 1$, Schoedinger's Equation becomes:

$$\Box\psi = -m^2\psi \quad \text{and} \quad \frac{\Box\psi}{\psi} = -m^2 \quad \text{where } \Box = \frac{\partial^2}{\partial t^2} - \nabla^2.$$
$$\text{and therefore} \quad \frac{\partial}{\partial x_i}\frac{\Box\psi}{\psi} = 0 \qquad (i=1,2,3,4) \quad [3] \qquad (3)$$

This equation, according to principle I, will be valid also in the case of a many bodies- system in order to avoid any notion of a spacetime particularity. That means that spacetime is described anywhere bya unique equation. This holds on the condition that ψ wave function is everywhere derivabel but at the same time its partial derivatives are discontinuous; the latter implies that equantion (3) is valid in the neighborhood of any point (r,t) but with a different m, which means that the generalized ψ function locally describes a aprticle field. Fractal geometry, e.g. Koch's curve [8], can introduce us to discontinnuous and derivable functions. Thus equation (3) is valid in the whole extent of the image of any matter field and is determined by the imposed boundary

New Energy Times Archive

Thus equation (3) is valid in the whole extent of the image of any matter field and is determined by the imposed boundary conditions. However, one may notice that equantion (3) does not take into account the potential which acts from a far distance. According to the present hypothesis there is not action from a far distance but action of space itself characterized by eqn (3). According to principle I, the local probability density P_i should have the same form as in the case of a particle field. Thus it should be valid that:

$$P_i(r,t) = (i/2m_i)(\psi^* \partial_t \psi - \psi \partial_t \psi^*)$$

The probability density P(r,t) of matter $M = \Sigma m_i$ in an infinitesimal region around (r,t) equals the product $(m_i/M)P_i$ which is equal to the probabilityof a particle to exist in this area teims the probability density which is created in the same area by a particle of mass m_i. Thus it holds:

$$P(r,t) = (m_i/M)P_i = (i/2M)(\psi^* \partial_t \psi - \psi \partial_t \psi^*)$$

Contrary to the fact that P_i, according to what has been accepted, cannot be considered as probability density, it can on the condition that P refers either to matter for P>0 or to antimatter for P<0. In that way the symbol P(r,t) of Schrödinger's relativistic eqn [9,10] can be regarded as probability density. According to Equation (c) (introduction) the above probability density creates a gravitational acceleration. Therefore Equation (3) describes any gravitational field completely. Since Equation(1) expresses a statistical identity, on condition that corollary I is valid, it generally applies to a matter system. On the basis that the generalized ψ function locally describes a particle field, Eqns

$$\Gamma r(r,t) = \sigma r(r,t) / \langle \overline{sr} \rangle^{1/2} = V_0^{1/2} \psi \qquad (4)$$

(1),(2) it is possible in general to apply to any matter system. Thus Eqn(3) is valid for the refered function:

$\langle \overline{sr} \rangle$ =const

and in the case that

for the function $\sigma r(r,t)$. *In this way it can be noted that the ψ wave function has a different, than the presently accepted, significance i.e it represents any refered com-*

$$\frac{\partial}{\partial x_i} \frac{\Box \Gamma r}{\Gamma r} = 0 \qquad (i=1,2,3,4) \qquad (5)$$

plex relative spacetime magnitude of the image of the field that it describes. Thus the generalized equation which describes the geometry of any gravitational field is:

The issue then of what the difference is between the gravitational (g) and the electromagnetic (em) space arises, because according to this hypothesis they are both described in spacetime terms. The answer to that question can be given on the assumption that real space has not only our known dimensions but also dimensions that correspond to electromagnetism

$$\left(x_{gi}, x_{\bar{g}i}, x_{emi}, x_{\bar{e}\bar{m}i}\right) \quad (i=1,2,3,4)$$

and to antimatter. Thus, every phenomenon can be described, under the same principles, in spacetime terms but through its relevant domain. Real space can be described through a coordinate matrix

where the symbol (-) corresponds to antimatter. This means that real space consist of four coexistent quantum spacetime gravitational fields i.e the gravitational field (g), the antigravitational field ($\bar{g}$ or antig), the electromagnetic field (em) and the anti-electromagnetic field ($\bar{em}$ or antiem). Since those spaces coexist they are interconnected with a scale which we shall try to define.

As has been mentioned earlier eqn.(3) is the unique eqn of gravitational fields. This means that the SRT is valid on condition that its results are acceptable only through the QM. Because of principle II velosity c is the same in the (g) and the (em) reference spacetime and because of Lorentz's transformations it is valid:

$$\hbar_{em} = \hbar_g$$

$$\Box_{em} + m_{em}^2 = \frac{\partial^2}{\partial_{em}^2} - \nabla_{em}^2 + m_{em}^2 = \gamma^2\left(\frac{\partial^2}{\partial_g^2} - \nabla_g^2\right) + k^2 m_g^2 = 0$$

$$\partial x_{gi} / \partial x_{emi} = \gamma \qquad (i=1,2,3,4) \qquad (6)$$

where γ, the correlation scale of (g) and (em) space. Upon the assumption that

$$\tau_{em}/\tau_g = \gamma, \quad l_{em}/l_g = \gamma^{-1}, \quad m_{em}/m_g = E_{em}/E_g = \gamma, \quad F_{em}/F_g = \gamma^2,$$
$$G_{em}/G = 1/\gamma^2, \bar{E}_{em}/\bar{E}_g = \gamma, \quad \hbar_{em} = \hbar_g$$

— which is found to be correct in the later- for particle fields it holds[9] that:

$$\hbar_{em} = \hbar_g$$

Therefore the mass scale will be $k = \pm\gamma$. Taking into account the formulation of various physical magnitudes as mass,energy, force, constant G (for gravitational particle pairs it is valid: $G_{em}M_{em}m_{em}=G_gM_gm_g = h/2\pi$ [7])) acceleration of gravity and constant $h/2\pi$, we obtain the following:

(7)

Thus the assumption that

is correct and it is noted that G is not the same for all gravitational spaces. The same are valid in the case of ($\bar{g}$) space. Applying Eqn (d)(introduction) to a pure gravitational field and to the energy levels of the atom of hydrogen [7] we obtain:

$$2\pi E_g r_g = hc, \quad 2\pi |E_{em}| r_g = \alpha hc \Rightarrow$$
$$|E_{em}| = \alpha E_g \quad \text{and} \quad |\gamma| = a$$

Because of eqns (6) γ should have the form: $\gamma = (1-v^2/c^2/)^{-1/2}$. Given that $\alpha < 1$ we will also have that $\gamma < 1$. However this is valid only when v >c γ is an imaginary number. Thus it holds: $|\gamma| = a$ and $\gamma \pm i\alpha$. For $|\gamma| = 1 \Rightarrow \gamma = \pm 1$ where the sign (-) corresponds to (`g) space. All these are compatible with the view that Schrodinger's equation can have either real or imaginary eigenvalues [7]. Therefore we have the following correspondence:

$$i\hbar \partial \Psi_g / \partial_g = \langle E_g \rangle \Psi_g, \quad i\hbar \partial \Psi_{em} / \partial_{em} = \langle E_{em} \rangle \Psi_{em},$$

and because of eqns (6)

$$(i\alpha) i\hbar \partial \Psi_{em} / \partial_g = \langle E_{em} \rangle \Psi_{em} \qquad (9) \qquad (10)$$

$$\gamma = 1 \rightarrow g, \quad \gamma = -1 \rightarrow `g, \quad \gamma = i\alpha \rightarrow em,$$
$$\gamma = -i\alpha \rightarrow e`m, \qquad (8)$$

In the case that a (g) particle field coexists with an (em) it will be valid that:

The energy mean value is independent of any position of the field and therefore its change is a function of time only. So taking into account the energy conservation principle, the fact that (em) energy is imaginary and eqns (9),(10) we have that:

$$\partial_{tg}(\langle E_g \rangle - i \langle E_{em} \rangle) = 0 \quad \text{and}$$
$$\partial_{tg}(\partial_{tg}\psi_g/\psi_g + i\alpha \partial_{tg}\psi_{em}/\psi_{em}) = 0 \qquad (11)$$

$$\partial x_{ig} \frac{\Box_g \Gamma_g(r,t)}{\Gamma_g} = 0, \quad \partial x_{ig} \frac{\Box_g \Gamma_{em}(r,t)}{\Gamma_{em}(r,t)} = 0, \quad (i=1,2,3,4)$$

$$\partial_{tg}\left(\frac{\partial_{tg}\Gamma_g(r,t)}{\Gamma_g(r,t)} + i\alpha \frac{\partial_{tg}\Gamma_{em}(r,t)}{\Gamma_{em}(r,t)}\right) = 0 \qquad (12), (13)$$

Eqn (11) shows the connection between (g) and (em) space, and is valid at every point of the coexisting particle fields which describe a particle matter field as a whole. According to principle I , Eqn(11) should be

$$P(r,t) = \left(\Gamma r^* \partial_t \Gamma r - \Gamma r \partial_t \Gamma r^*\right) / \int_{\Omega_0} \left(\Gamma r^* \partial_t \Gamma r - \Gamma r \partial_t \Gamma r^*\right) dr^3$$

extended in the case of a matter system

New Energy Times Archive

Since eqn(1) expresses a statistical identity, on condition that corollary I is valid, it generally applies to a matter system. Thus we have:

$$\overline{sr} = \langle \overline{sr} \rangle V_0 P(r,t) \qquad (15)$$

Observable magnitudes can be derived with the aid of eqns (14),(15). According to what has been mentioned, eqn (15) is valid for all gravitational fields ie for (g,$\bar{g}$) and (em, $\overline{em}$) spaces. The mean value

$$\langle \overline{sr} \rangle$$

can be calculated with the aid of the spacetime operators and the aid of statement II. However this calculation is beyond the scope of tis work and could be the subject of a new paper. Taking into account the definition of the image of the field and that relative time and a relative length are defined both as quantum and as spacetime magnitudes (statement II) we obtain:

$$\overline{tr}(r,t) = \left.\frac{dt}{d\overline{t}(r,t)}\right|_{r=const}, \quad \overline{lr}_n(r.t) = \left.\frac{dx_n}{d\overline{x}_n(r.t)}\right|_{t=const}$$

$$\text{and} \quad \overline{t}(r,t) = \int_0^t \frac{dt}{\overline{tr}(r,t)}, \quad \overline{x}_n(r.t) = \int_0^{x_n} \frac{dx_n}{\overline{lr}_n(r.t)}$$

(16), (17)

Eqns (12) to (16) and (a) to (d) (introduction), constitute the proposed system of equations of the image of the unified matter field i.e of ***the image of the quantum-spacetime.*** *Eqns (17) define the transformations of mean deformity of the unified matter field.* It is noted that $\overline{t}$ $\overline{r}$ is not conected with $\overline{x}_n$ but with x_n ; thus the above transformations are not coordinate transformations and therefore they cannot apply in the GRT [11,12].

VERIFICATION

1)From eqns (7) we have that:

$$m_g\delta_g / m_g\delta_g = 1, \quad m_{em}\delta_{em} / m_g\delta_g = -\alpha^2, \quad m_{em}\delta_{em} / m_g\delta_g = \alpha^2, \quad m_{em}\delta_{em} / m_g\delta_g = \alpha^2, \quad m_{em}\delta_{em} / m_g\delta_g = -\alpha^2$$

From the above relations it is noted that: a) the gravitational force of ($\bar{g}$) space has the same direction with the one of (g) space which means that the action of antimatter is not opposed to gravity. b) considering the negative load as (em) space and the positive one as ($\overline{em}$) it is confirmed the common verification that oppositely charged loads attract each other while similarly charged repel. With these as basis and taking into account the interpretation of probability density of Schrodinger's relativistic eqn we see that for the case of cooperated oppositely charged loads (e.g. loads in the atom of hygrogen) we can observe the distinction between matter and antimatter. According to the spirit of this work the same are expected for the case of ($\bar{g}$) and (g) spaces.

2) Due to the statistical nature of space, from eqn (15) we have:

$$\overline{sr} = \langle \overline{sr} \rangle V_0 P(r,t) = \langle \overline{sr} \rangle_k V_k P_k(r,t), \quad \int P_k(r,t) dr^3 = 1$$

where k indicates any region around (r,t) and P_k the renormalized probability density the region considered as a whole. Thus in the case of relative length in two acci dental directions $\vec{n}_1$, $\vec{n}_2$, it is valid that:

$$\frac{\overline{lm_1}(r,t)}{\overline{lm_2}(r,t)} = \frac{\overline{dln_1}}{\overline{dln_2}} = \frac{\langle \overline{lm_1} \rangle_K}{\langle \overline{lm_2} \rangle_K} = \frac{\langle \overline{lm_1} \rangle}{\langle \overline{lm_2} \rangle} \qquad [3]$$

where dln_1, dln_2 the mean real infinitesimal lengths in the directions n_1 and n_2 respectively, corresponding to the same infinitesimal length of the reference spacetime, at any point in the field. The above relation expresses selfsimilavity of a particle field at time t in the whole of its extent, and in the case that P(r,t) expresses a matter probability density, a relation of selfsimilarity of a matter system in general. This selfsimilarity constitutes a strict geometrical relation in the infinitesimal scale while it constitutes a trend in every scale k being compatible with fractal geometry [8,13] . The latter is a geometry of nature and has been already applied in various matter systems. From what it has been mentioned it is obvious that the compatibility of the quantum spacetime structure of matter with fractal geometry consists a confirmation of the present hypothesis of the unified matter filed. With these as basis the question is whether the mean geometry of the unified matter field is fractal geometry according to the meaning that B.B. Mandelbrot [13] attributes to it. It is noted that, we can reach to the meaning of the fractal dimension through Riemann's geometry when as the fourth dimension we consider the fraction (c'/c) of the dimension of time, that is essentially the *timevelocity* [3], where c' the local velocity of light. The fact that this velosity is not constant in a matter system has been confirmed experimentally [14,15] while observations of the behaviour of electrons in magnetic fields have lead P.Beckmann [16] to the conclusion that the speed of light is constant in reference to the dominant filed and not to the observer.

DISCUSSION

1. Applying principle II for two plain spacetimes containing energies E_0, mc^2 respectively we have that the relative length of these spaces is E_0/mc^2. Therefore it is expected that the operator of the relative length (in a direction n with respect to the space time of reference with energy $E_0 \neq mc^2$) will be

$$\hat{LR}_n = \left(1 - c^2 \frac{\partial^2/\partial x_n^2}{\partial^2/\partial t^2}\right)^{1/2} \cdot \frac{E_0}{mc^2} .$$

The significance of the operators of Eqns(b)(introduction) together with the present elucidation becomes clear through statement II given that with this principle as basis it is possible to derive quantum expressions for the local magnitudes of the relative time, volume and length. *Through the use of these operators we can solve the problem of the quantum-spacetime geometry on condition that ÿ wave function is known from the QM.*

2. According to the present work interaction of spaces (em), ($\overline{em}$) is possible in the case of an electron rotating around a proton. Interaction however means coexistence and coexistence of (em), ($\overline{em}$) spaces means gradual charge annihilation and radiation which, finally may lead to the entire diasappearance of these charges, something that is not happening. Therefore the following question is posed: where from comes the energy which replaces this gradual disappearance? From Eqn. (d)(introduction) results that the energy is reduced when the volume is expanding. This is expected because in general the expansion of the particle fields is caused by the expansion of the Universe. Therefore according to the energy conservation principle it can be written:

$$dE_e + dE_g = 0 \text{ and } Tds = \phi dE_e \quad (0 \le \phi \le 1)$$

which shows that the gravitational energy loss (dE_g) because the expansion of the Universe is converted into (dE_e) a part of which is the radiation (Tds). Given that (dE_g) is less than zero it is obvious that[3]: $dS \ge 0$

Therefore using as basis the present hypothesis and based on the predominant view that the Universe is expanding, the second law is derived; this under certain conditions is possible to be locally invalid showing in that way the possibility of generating order [17]. In the case of deceleration of the electrons of an atom e.g. through proper magnetic fields a falling trend is expected that is an approach of (em) with ($\overline{em}$) space, an increase in the rate of annihilation-radiation, an increase in the rate of replacement from the gravitational space and a decrease of the energy of the surrounding gravitational space.

New Energy Times Archive

Due to the equivalence of energy and time a decrease of relative time tr will be expected, according to eqn(a) (introduction), and because of Eqn (c) (introduction) what is shown in Figure 1a will take place, that is the attraction on an object is attributed to the fact that the space under the object attracts the object more than the upper one and that $\bar{t}\,\bar{r}_2 > \bar{t}\,\bar{r}_1$. If according to what was mentioned above succed in having $\bar{t}\,\bar{r}_2 \leq \bar{t}\,\bar{r}_1$ then an ascending movement of the object will start as it is shown in Fig.1b [3,7] which is the main purpose of the gravitation technology. All these may constitute a new myth for matter and for spacetime, however these are stated here because they are in agreement with the spirit of this work offering to this a possible passage to verification.

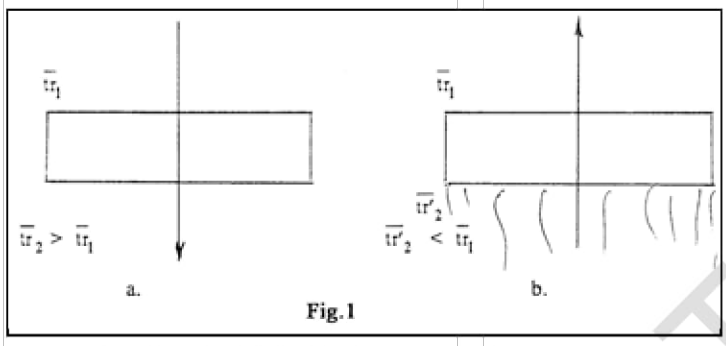


Fig.1

ACKNOWLEDGMENTS

The author wishes to thank Dr. G. Papapolymerou for the useful discussions that he had with him.

REFERENCES

1. E.Nagel and J.R.Newman, 1958. *Godel's Proof*, N.Y.University Press.
2. H.Eves,1983. *Great Moments in Mathematics*, Mathematical Assosiation of America.
3. A.A.Nassikas,1995. The Claim of the Minimum Contradiction, Publ.Trohalia, p.220 (in Greek, ISBN 960-7022-64-5)
4. I.Kant. Prolegomena zu einer jeden kunftigen Metaphysik, die als Wissenschaft wird auftreten konnen (1783).
5. I.Kenyon,1990, *General Relativity*, Oxford University Press.
6. Ph.M.Kanarev,1995, *On the Way to the Physics of the XXI Century*, Publ. Soviet Kuban, p. 269. Krasnodar.
7. A.A.Nassikas,1994, The Hypothesis of the Unified Field and the Principle of its Dual Interpretation. III International Conference: "Problems of Space, Time, Gravitation," Russian Academy of Sciences, SRIRE-Politechnika. St.P., Russia.
8. Gleick,1987. Chaos: *Making of a New Science*, Viking Penguin Inc.
9.S. Trahanas,1990, *Relativistic Quantum Mechanics* I. Publ. Univ. of Creta, Greece.
10. L.I.Shiff,1968. *Quantum Mechanics*, McGraw Hill, N.Y.
11.W.T. Grandy, 1970. *Introduction to Electrodynamics and Radiation*, Academic Press N.Y.
12. R. Adler, M. Bazin and M. Shiffer, 1965. *Introduction to General Relativity*, McGraw Hill N.Y.
13. B.Mandelbrot,1977, *The Fractal Geometry of Nature*, Freeman.N.Y.
14. S.A.Tolchenikova-Murri,1993."The Doppler Observations of Venus Contradict the SR,". *Galilean Electrodynamics*, Vol.4, No1.
15. H.C.Hayden, 1993, "Stellar Aberration," *Galilean Electrodynamics*, Vol.4, No.5.
16. P. Beckmann, 1987, *Einstein plus two*, The Golem Press, Boulder, Colorado.
17. I. Prigogine and I. Stengers, 1984. *Order and Chaos: Man's New Dialog with Nature*, Heinemann, London.

Infinite CLASSIFIED MARKETPLACE

SPACE ENERGY RECEIVERS—Power from the Wheelwork of Nature. Space energy receivers are defined as devices which apparently collect electrical energy from the surrounding space without applied force, by some process other than chemical or mechanical action. This booklet describes eight inventors and their devices, covering the years 1901 to 1945. Send $8.50 (postpaid) for US and Canada; $10.00 overseas, to: Simplified Tech. Service, P.O. Box 2140A, Champaign, IL, USA 61825

YOUR CLASSIFIED AD could be here! It will be seen by thousands of readers in at least 36 countries. Call-in, fax-in or mail-in your ad today. Credit card ad placement is fine with us! ***Just $0.50 per word.***

Have electronic or other scientific equipment to sell, information to sell, newsletters, etc.? This is the water-hole for curious minds.

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302
Phone: 603-228-4516
Fax: 603-224-5975

Spread the Message!

•••••Order
Bulk Copies
of
INFINITE ENERGY
Today •••••••

Minimum Order for Discount:
25 copies
U.S./Canada Rate $100 per 25 copies
Other Foreign: $140 per 25 copies
(Plus shipping charges.)

EXPAND YOUR UNIVERSE..... GIVE GIFT SUBS-CRITIONS
of
Infinite Energy

New Energy Times Archive

*Washington Watch.....*Update: Whither Hot Fusion?

Nature and the *New York Times* look at Hot Fusion

by Jed Rothwell

ITER, the International Thermonuclear Experimental Reactor, is the $10 billion flagship program of the tokamak plasma fusion (hot fusion) research program. It is a joint project of the U.S., the European Union, Japan and Russia. ITER was established because the cost of hot fusion research is so high and the 50-year projected development is so long that national governments felt they could not longer afford to go it alone. Most of the funding for the national research projects was supposed be folded into the joint project.

Behind the scenes, hot fusion research has long been controversial. Some plasma fusion scientists feel that the tokamak design is obsolete; it will take too long; and it has soaked up too much funding from alternative approaches. Objections from within the field have been raised. During Congressional hearings in 1993, Dr. Robert Hirsch, one of the pioneering developers of the tokamak recommended that funding be cut back and redirected to more innovative new approaches, especially advanced light water moderated fission reactors (ALWR).[1] Among other advantages, ALWR would be simpler, far cheaper, and they would produce less radioactive waste than tokamak reactors, according to studies at the Electric Power Research Institute (EPRI). In 1994, a four-year study of hot fusion was released by Los Alamos.[2] It concluded that "all of the ARIES [advanced tokamak reactor] designs would not be competitive with respect to Advanced Light Water (fission) Reactors." The report shows that projected saving from environmental, safety and health (ES&H) advantages cannot justify the cost of tokamak reactors. The report concludes:

> **"While ITER is expected to make important contributions to the understanding of long-pulsed, alpha-particle-heated DT plasmas, the ITER design so far is based primarily on a scaling upward in size of known physics rather than an exploration in directions where practical tokamak power stations may reside."**

Since 1995, funding for U.S. magnetic confinement hot fusion research has been reduced from $360 to $240 million. Our biggest hot fusion research reactor, at the Princeton Plasma Physics Laboratory (PPPL), has been shut down. U.S. contributions to ITER have been cut, and years ago the U.S. declared that it is not interested in hosting ITER construction. The country that hosts construction will have to pay a larger share of the expenses. Last year, the French and German governments jointly announced they have no interest in hosting the project, and last month the Japanese government rejected it. The Russians cannot even afford to pay the normal dues to the project although, *Nature* says, they continue to make impressive technical contributions. Only Italy and Canada have expressed interest in hosting it. ITER is beginning to look like the Flying Dutchman. It also has the distinction of being the only industrial project in history to slip fifty years behind schedule during a twenty-five-year period.

The Media Takes Notice

The doubts, the technical problems, politics, and financial woes of the ITER program have finally surfaced in public discussion. In April 1996 the *New York Times* published an article titled "Quest for Fusion Power is Slowed by Cutbacks."[3] It describes some of the technical and funding problems, and even comments that "not all scientists regard the fusion cuts as a bad thing."

Nature, the bastion of mainstream physics, published four articles about ITER. The longest, by Colin Macilwain is titled "Is magnetic fusion headed for ignition or meltdown?"[4,5,6,7]. He begins by saying that ITER "has recently run into a quagmire of technical, economic and political uncertainties that will require all the efforts of its supporters to overcome." The problems are not recent, they have been festering for years. The *Times* and *Nature* soft-pedal the difficulties. They describe some of the political problems, but they barely scratch the surface of the technical difficulties.

Defenders of the tokamak program do not sound confident. *Nature* quotes one: "A number of results have been very promising. When someone says it would be impossible, I don't think they know the data." Few people assert that hot fusion is impossible; they say it is impractical, or too expensive compared to alternatives. The director of the program, Aymar, comes out with this ringing endorsement: "For the tokamak, I'd like to say what Churchill said about democracy. It may look bad, but there is no other line of enquiry that would be better." *Nature* describes this statement as "modest." I would say the man has taken leave of his senses. No other line?!? Dozens of new conventional energy sources look "good" or even "fabulous." They range from ALWR to solar to wind generation, which is now the cheapest form of electricity in many locations, thanks to EPRI research. There is no point to embarking on a large-scale, long term development project which looks dicey before it even begins. Even when the project has everything going for it, no known technical difficulties, and it looks like it will beat the competition, you know problems will crop up later on. The tokamak has battled for 40 years with nearly insurmountable difficulties. It is in a race with competitors like wind-power, which is already cheaper than fossil fuel, and which is already paying for itself, even though serious development on it only began a decade ago.

Other tokamak scientists also have a peculiar idea of what constitutes success. One said that JET was "100-fold away from the minimum value predicted to achieve ignition. Now we are only four or five times short of the minium value." Some suggest that the program should continue because it is a splendid example of international cooperation, or because we have spent so much, we cannot let go, we must throw good money after bad:

> **". . . even as construction is delayed, none of the partners wants to pull the plug on an international collaboration that has probably run as long and deep as that in any science disciple. Indeed, the scientific collaboration itself is a major reason why political supporters of the project, such as [Congressman] George Browns . . . stand by it. "I think it will be built," he says."**

As often happens when a giant project gets in trouble, the bureaucrats have recommended that the program be stretched and decisions put on hold. *Nature* comments, "the decision about whether to build [ITER] is almost certain to be delayed by three years because of lack of political enthusiasm." It should be understood that when giant government research project like ITER or the space station are "delayed" or "stretched out," they still bleed money at a rate that would be considered catastrophic in private industry. The U.S. alone contributed $80 million to ITER in 1985, and it will pay $55 million this year. ITER leaders say they are not fazed by the three-year delay, because it will give them "time to carry out more scientific experiments to help reduce the uncertainty about the design, particularly the key issue of ignition of the plasma." This aspect of the design was called into question by

New Energy Times Archive

research at Institute of Fusion Studies at Austin last year, in a widely publicized paper. The extra years will also give more time for site selection and "pre-licensing procedures for several potential sites at the same time"— lots of work for lawyers. Others express fear that the delay may "drain the program of momentum." Some enemies of the program hope it will.

Nature discusses the unthinkable. The Netherlands, which now holds the rotating presidency of the EU, has commissioned a study of alternatives for ITER funding. "Two of the options are relatively extreme, and few take them seriously. One would be to stop fusion research completely. The second option would be to abandon the four-way ITER partnership and build a European only version of ITER." Even some supporters have their doubts. Americans were surprised at news of weakening support overseas. *Nature* asked Richard Hazeltine, director of the Institute of Fusion Studies at Austin, whether he still believes ITER will be built. He replied, "No, I do not. I knew there were reservations in the United States, but when I learned that Europe and Japan were ready to delay construction, I took that to be an ominous indicator."

The Situation in Japan

Triend describes the situation in Japan, leading off with: "Japanese hopes of hosting the ITER reactor received a severe setback last month from a budget reform plan that puts a ban on inviting the project into the country for the next three years." The article says Hitachi, Toshiba and Mitsubishi Electric are fighting the setback because "they expect to win important engineering contracts if the project is built in Japan." The Keidanren is also lobbying for the project. There is no indication that the Japanese electric power industry wants ITER any more than it wants the breeder reactor program.

Opposition to the project has been led by anti-nuclear citizen groups until recently, but now more influential groups have criticized it, including the largest newspaper, the *Yomiuri*. The projected construction cost is $7.3 billion. People suspect the actual final cost may be twice this. Japanese officials dismiss these estimates, but they agree that "realistic cost estimates are needed" and that "cost efficiency is a precondition for Japan to host ITER." Some Japanese scientists criticize the project because it is too expensive and it shuts out promising alternative methods of achieving hot fusion. Japanese universities have recently made progress with helical fusion devices, a method largely abandoned in most other countries.

Despite the opposition to ITER, officials at the Science and Technology Agency (STA) say the project is "inevitable." A person outside of the big government science establishment may find this difficult to swallow. The STA runs Japan's premier hot fusion research lab, the Japan Atomic Energy Research Lab, with over 1,600 researchers. This lab has come under "increasing pressure" from powerful organizations like the Power Reactor and Nuclear Fuel Development Corporation because of its handling of previous projects, particularly the breeder reactor program. *Nature* says "according to some observers, the institute is in considerable need of an overhaul and a new lead project such as ITER." The breeder program, centered around the $5 billion Monju reactor, is one of the most expensive fiascos in history. The reactor has a series of highly public accidents. It is now expected to operate for only seven years. Even if it worked perfectly, the electricity generated from the plutonium it produces would be 5 to 15 times more expensive than electricity from uranium or fossil fuel. These people make a monumental error, yet they want to be given ITER, a project even more complicated, expensive, and fraught with unanswered scientific questions than the breeder reactor. The STA does not need an "overhaul," it needs to be abolished! All 1,600 employees should be fired.

In a giant bureaucracy like the STA, or in the pages of a big-science establishment apologist like *Nature*, it seems normal to reward a $5 billion disaster with an even more ambitious $10 billion project. It is hard to imagine anything this outrageous happening out in the real world, but suppose General Motors built a $5 billion factory to make compact cars. Suppose the factory was dangerous, already falling apart before it could be opened, likely to last only seven years, and it turned out the cars 15 times more expensive than normal, costing $200,000 each. There would be lawsuits, criminal investigations, a stockholder revolt, and mass firings, not "a new lead project."

Is ITER Really So Expensive?

The ostensible reason for pooling resources into ITER project is the expense. Governments feel they can no longer afford to go it alone. A DoE panel said that "the pursuit of fusion energy is of such cost and complexity that it can only be achieved through international collaboration." After all, $10 billion is a lot of money. It is enough to buy four advanced computer chip fabrication factories. It is almost as much as Southern California Edison plans to spend for scrubbers to reduce pollution from coal fired plants. It may be a lot, but Southern California Edison alone could afford to pay for entire cost of the ITER program. There are hundreds of large electric companies worldwide; if the managers at *one* of them believed that tokamaks might become a viable way to generate electricity, they would not hesitate to build ITER on their own. They spend far greater sums building conventional plants and on pollution control. Companies like General Electric and Hitachi, which manufacture conventional power generating equipment, would earn a fantastic amount of money if they could sell viable tokamak power reactors. They could easily afford the $10 billion. Yet there is no private investment in hot fusion. EPRI, the industry research consortium, will not touch it. *Nature* says "Japanese industry" is fighting the ITER cutbacks, but it refers to government contractors. They want to be paid tax money to do hot fusion, they are not willing to invest their own money in it. Measured in terms of risk, $10 billion for ITER is a gigantic investment – too big for any bank or corporation. When Exxon managers put $10 billion into new refineries and oil tankers, they know they will earn the money back soon. The risk is nearly zero. EPRI judges that it is worth risk billions on a new generation of light water fission reactors (ALWR). The risks are high, but the reactors would be safer, cheaper, and less radioactive than tokamaks, and probably cheaper than conventional fossil fuel plants. Corporations are risking money on many new energy technologies, but nobody outside of the DoE and the other government ministries is willing to risk any money on hot fusion. It is technology that only a bureaucrat can love.

Footnotes

1. R. Hirsch, Statement for the Record, Committee on Science Space and Technology, May 5, 1993, p. 221.
2. R. Krakowski, et al., "Lessons Learned from the Tokamak Advanced Reactor Innovation and Evaluation Study (ARIES)," Los Alamos National Laboratory and U.S. DoE, Office of Fusion Energy.
3. M. Browne, "Quest for Fusion Power Is Slowed by Cutbacks," *New York Times*, April 23, 1996.
4. C. Macilwain, "Is magnetic fusion headed for ignition or meltdown?," *Nature*, Vol. 388, July 10, 1997.
5. R. Triend, "Japanese industry fights budget setback," Nature, Vol. 388, July 10, 1997.
6. A. Abbott, "European passions cool as bill increases," *Nature*, Vol. 388, July 10, 1997.
7. A. Abbott, "Global fusion plans face three-year delay," *Nature*, Vol. 387, June 19, 1997
8. D. Sanger, "Japan's Nuclear Fiasco," *The New York Times*, December 20, 1992.

$BILLIONS AND $BILLIONS?

Dr. Carl Sagan on hot fusion —from his last book (Billions and billions, New York, Random House, 1997):

"There is another kind of nuclear power—not fission, where atomic nuclei are split apart, but fusion, where they are put together. In principle, fusion power plants might run off seawater—a virtually inexhaustible supply—generating no greenhouse gases, posing no dangers of radioactive waste, and wholly uninvolved with uranium and plutonium. But "in principle" doesn't count. We're in a hurry. With enormous efforts and very high technology, we are now perhaps at the point where a fusion reactor will barely generate a liffle more power than it uses up. The prospect for fusion power is a prospect of hypothetical, enormous, expensive, high-technology systems, which even their proponents do not imagine being available on a commercial scale for many decades. We do not have many decades. Early versions are likely to generate stupendous quantities of radioactive waste. And in any case, it's hard to imagine such systems as the answer for the developing world."

Non-commercial use only

Highlights from Infinite Energy™ Magazine

Cold Fusion Technology, Inc. P.O. Box 2816, Concord, NH 03302 Fax: 603-224-5975; Phone: 603-228-4516

(The following listing is not comprehensive. There is much more in each issue!)

Volume 1—1995-1996

Issue #1 (52 pages)

• "Cold Fusion: A Brief History of Mine" (Nobel Laureate Julian Schwinger) • "Welcome to the Apocalypse?" (Arthur C. Clarke) • Very Hot Cold Fusion: Ceramic Proton Conductors from Japan • Preview of Monte Carlo, Fifth International Conference on Cold Fusion • Table-Top Alchemy: Roger Stringham's Ultrasonic Cold Fusion Creates Helium-4 and Helium-3 and Lots of Excess Heat • Testing the Patterson Power Cell • Water Cavitation Reactor (Michael Huffman) • Japan TV Features "Over-Unity" Magnetic Motors

Issue #2 (56 pages)

• COLD FUSION Goes Commercial— Dr. James Patterson and Jim Reding of Clean Energy Technologies, Inc. (CETI) Aim to Help Clean Up the World • ICCF5—Fifth International Conference on Cold Fusion • Alchemy Nightmare: Skeptic Finds Heavy Element Transmutation in Cold Fusion Experiment • Magnetic Resonance Amplifier • Major Oil Company Reveals Secret Positive Cold Fusion Experiment of 1989 • Moldova Water Fuel Device • The MIT Cold Fusion Patent (#5,411,654) • Experimenter's Corner: Nuclear Effects from Self-heated Wire? •Unitary Quantum Mechanics (Lev Sapogin)

Issue #3 (60 pages)

• Low Energy Transmutation Conference in Texas • Testing Excess Heat Cavitation Devices (Worldwide Reports) • Cold Fusion Companies and Products • High-School Student's Cold Fusion Experiments • Applying the Nucleon Cluster Model to Experimental Results • Table-top Sonoluminescence • How to Miss the Energy Boat • A Brief History of a Book • Mechanisms of a Disobedient Science

Issue #4 (60 pages)

• Pons and Fleischmann Patent to Issue in Europe • Mizuno's Solid-State High Temperature Cold Fusion • 80-to-1 Cold Fusion Demo at Hot Fusion Meeting • Atomic Bomb Physicist (Dr. Joseph McKibben) Proposes Startling Cold Fusion Theory • The Piantelli Cold Fusion Patent • ICCF5 Talk by Los Alamos's Dr. Edmund Storms • Kawai Magnetic Motor (US Patent #5,436,518) • Acoustic Levitation • The New Scientific Age (Dr. Brian O'leary) •Cold Fusion Documentary, "Too Close to the Sun" on BBC and Canadian TV

Special Double Issue

Issue #5&6 (120 pages)

• CETI's 1-kilowatt Cold Fusion Demo • *Infinite Energy's* 1996 Cold Fusion Symposium, Cambridge, MA • Patterson Power Cell on ABC-TV Good Morning America and Nightline • Latest Patterson Patent • Takahashi's Super Magnets • Master Principle of EM Over-Unity (Tom Bearden) • HydroCatalysis Power Corporation • Chinese and Russian Cold Fusion Conferences • Transmutations in Palladium (Bockris and Minevski) • The Nucleon Cluster Model (and *color* periodic table) • The Energy Active State in Pd-D (Ed Storms) • Griggs HydroSonic Pump • Newman's Energy Machine • **COLD FUSION RESOURCE GUIDE —1996** (Frequently Asked Questions; Cold Fusion, What it Does; Basic Information Resources; Seminal Articles: Experimental Evidence; Highlights of Cold Fusion History: A Timeline

Volume 2—1996-1997

Issue #7 (72 pages)

• The Correa Pulsed Abnormal Glow Discharge Reactor —Generating Electricity NOW! •Japan Research Yields Transmutations in Metals • International Symposium on New Energy-III (Denver) • Los Alamos Lab's Cold Tritium Generator Goes Public • NASA Confirms Excess Energy • Cold Fusion and New Energy—An Environmentalist's Perspective • The Energy Machine of Joe Newman (book review and other reports) •

Issue #8 (64 pages)

•Overview of the Correa Invention (Mike Carrell) • The Reality of Perpetual Motion (Dr. Harold Aspden) • A "Chain Reaction" of New Energy Movies (*Chain Reaction* Debuts) • Properties of Palladium and the PF Effect (Ed Storms) • Interviews: Dr. John Bockris and Dr. Hal Puthoff • SuperTube (Moray King)

Issue #9 (72 pages)

• Prof. George Miley, *Fusion Technology* Editor, Confirms Low Energy Transmutations in Patterson Cell • "SuperPower, Inc." Investment Fund (Eugene Mallove) • Cold Alchemy: Landmark Low Energy Transmutation Conference in Texas • AquaFuel -Wonder Fuel of the New Energy Age • The Wright Brothers and Cold Fusion (Jed Rothwell) • "Anti-Gravity" Experiments Go Public • Mass Modification Experiment Definition Study (Dr. Robert L. Forward) • Book Review: *The Coming Energy Revolution* (Jeane Manning)

Issue #10 (72 pages)

• CETI's Table-Top Research Nuclear Reactor, Rent for only $3,750/Year • ICCF6 in Japan — Sixth International Conference on Cold Fusion • Transmutation in Biology? • Experimenter's Corner: Iron from Carbon, Oxygen, and Hydrogen??? • "Over-Unity" in Carbon Arc Nuclear Reactions • Adams Aspden Motor Patent •Triode Cold Fusion Cell (Evan Ragland) • Open Letter to Japan's NHE Cold Fusion Lab Directorate •Breakthrough in Thermoelectrics

Issue #11 (80 pages)

• An interview with Dr. Martin Fleischmann (Chris Tinsley) • *The Saint* Cold Fusion Movie • Vacuum Energy Patent Issued (#5,590,031) • Zero Point Energy Confirmed at Los Alamos • More AquaFuel Testing • Review of EPRI -SRI International Cold Fusion Report • Coping with the US Patent Office on Cold Fusion • BlackLight Power Corp • Review of Graneau's *Newtonian Electrodynamics* • Experimental Evidence for Nucleon Cluster Model • Adams-Aspden Motor Patent

Issue #12 (72 pages)

• BlackLight Power Corporation and Randell Mills • Arthur C. Clarke on Cold Fusion • Cold Fusion and the Future (Part I, Jed Rothwell) • Cold Fusion Cell Makes DOE Cold Fusion Critic Blink • Arata and Zhang: Massive Helium/Heat Production in Cold Fusion • Protonic Conductors and Cold Fusion—A Russian Perspective • Charge Clusters in Operation (Hal Fox) • *Wizard* Tesla Biography (Jeff Kooistra) • Energy Gain in Low Energy p and D Nuclear Reactions • Palladium, Platinum, Gold Futures • Drs. Patterson and Cravens Receive New Cold Fusion Patent • CETI/ENECO Patent Dispute in Europe

New Energy Times Archive

SUBSCRIBE TO THE LEADING PUBLICATION →

Infinite Energy

Cold Fusion and New Energy Technology

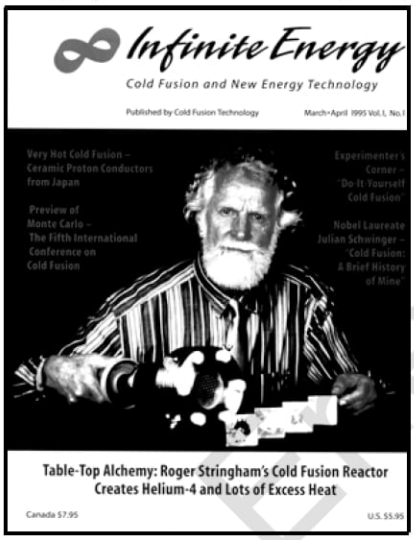
(ISSN 1081-6372)

Eugene F. Mallove, Sc.D., Editor-in-Chief

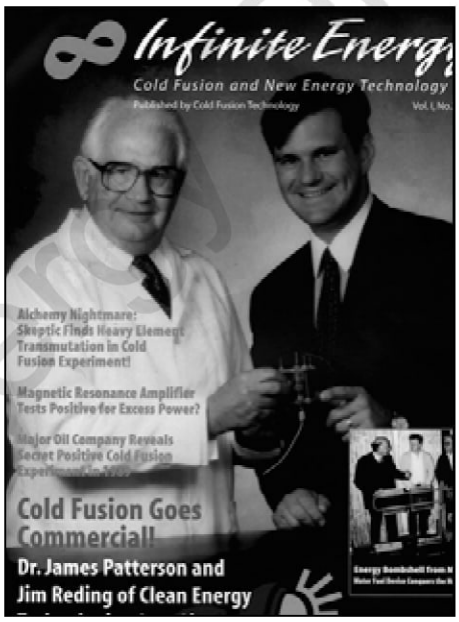
Now in our second year, ***INFINITE ENERGY*** magazine premiered with the March/April 1995 issue, which was distributed to the participants of the Fifth International Conference on Cold Fusion (ICCF5), held in Monte Carlo, Monaco (April 1995). The May/June 1995 issue was sent to many hundreds of current subscribers, journalists, and libraries. In 1997 we passed the 1,500 subscribers mark and now have subscribers in over **three-dozen countries.** The magazine now has limited distribution on select U.S. newsstands and is expected to expand greatly, now that commercial applications are emerging . *IE* is presently subscription-driven through ads in international magazines. Typical 1996/1997 press run: 5,000 copies/issue. **[WWW site— http://ourworld.compuserve.com/homepages/JedRothwell]**

INFINITE ENERGY is an international technical magazine with outreach to the general public as well. It is written at the technical level of *Scientific American* or *Science News*—except for some highly technical papers which are original contributions. To maintain the highest editorial standards, it is written and edited by scientists, engineers, and expert journalists. It is aimed at pioneering scientists, engineers, industrialists, and investors who are entering an exciting new R&D area. This continues to grow explosively, with significant involvement by corporations and institutions in the U.S., Japan, France, Italy, India, Russia, and China. New technology developments and scientific discoveries are being made monthly and reported in the peer-reviewed scientific literature. ***INFINITE ENERGY*** reports on the latest information that is now pouring in from research centers around the globe.

The **highly affordable** subscription price of this six-issues/year publication of general *and* technical interest is



SUBSCRIBE TODAY!



····· only $29.95 for residents of the U.S. and Canada.
(To cover first-class air mail for other countries, the annual foreign subscription price is $49.95.) .

Subscribe to
INFINITE ENERGY **,**
beginning with Issue #1, #2, #3, #4, #5/#6,#7,#8, #9, #10, #11, #12, #13&#14 or #15
(Any six back issues, $29.95 in U.S. and Canada)
($49.95 / six for other foreign)

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816

Name:_____ **Start at:** Issue #1, #2, #3, #4, #5/#6, #7, #8, #9, #10, #11,#12 #13 (**Circle One**)
Address:_____
Address:_____
City:_____ State:_____ Postal Code/Zip:_____
Country:_____ Phone:_____ Fax:_____
If using Credit Card: Check one: Master Card ____ VISA____American Express__
Card Number: _____ Expiration Date: _____
Signature_____ **Optional:** E-Mail address_____

Fax: 603-224-5975; Phone: 603-228-4516 E-mail: INTERNET:subscribe@infinite-energy.com

New Energy Times Archive